SAMSUNG

LASER PRINTER

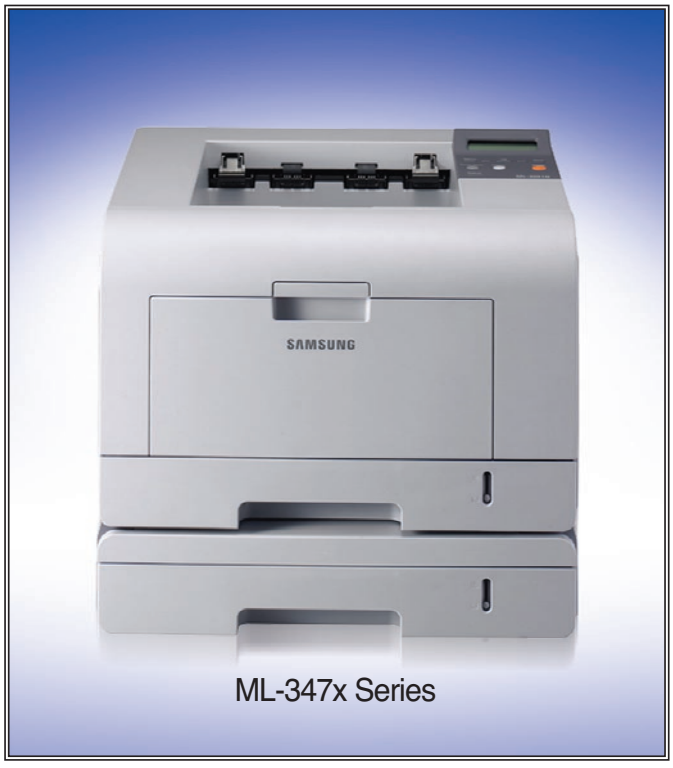
ML-347x Series

ML-3471ND/XAX

Basic Model : ML-3471ND

SERVICE Manual

LASER PRINTER



ML-347x Series

The keynote of Product

Upgrade to Speed_up model(ML-347x) of the ML-3050 serie

1. Speed: Up to 33ppm (Ltr. 35ppm), 1200x1200dpi Effective output
2. Paper Path: MPF Type Cassette
3. Emulation: PCL6, PS3
4. CPU: SPGPv3
5. Memory: 16~64MB Standard
6. Cassette: 250 sheet Cassette
7. MP: 50 sheet MP
8. Lan: 10/100 Base TX (ML-3471ND)
9. I/O: USB 2.0, IEEE1284
10. Toner: 10K Toner (4K initial)
11. Option: 802.11b/g Wireless N/W, 250 sheet Opt. SCF
12. Duplex: Built in Duplex

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4. Alignment & Troubleshooting

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1. Precautions

The cautions below are items needed to keep in mind when maintaining and servicing.
Please read carefully and keep the contents in mind to prevent accidents while servicing and to prevent the machine from getting damaged.

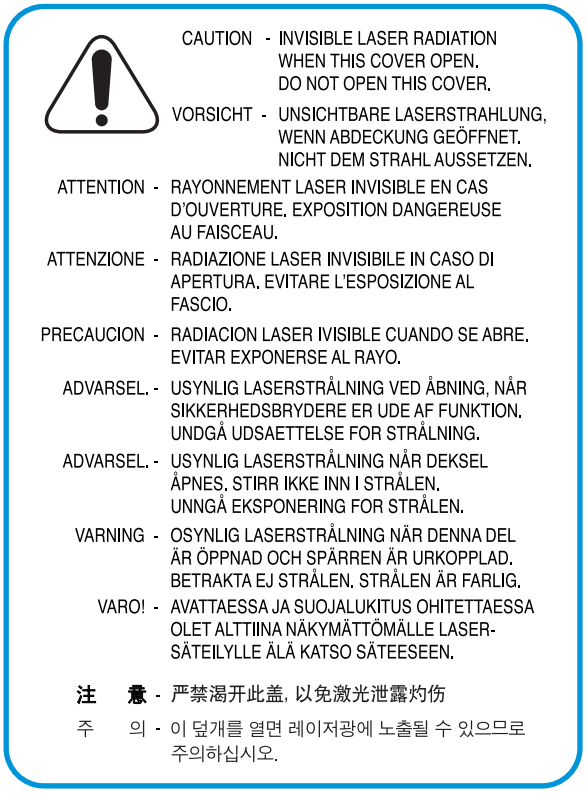
1.1 Safety Warning

(1) Request service by qualified service person.
Service for this machine must be performed by a Qualified service person. It is dangerous if unqualified service personnel or users try to fix the machine.

(2) Do not rebuild.
Do not attach or change parts discretionary. Do not dissemble, fix of rebuilt it. If so, printer will abnormally work and electric shock or fire may occur.

(3) Laser Safety Statement
The Printer is certified in the U.S. to conform to the requirements of DHHS 21 CFR, chapter 1 Subchapter J for Class 1(1) laser products, and elsewhere, is certified as a Class I laser product conforming to the requirements of IEC 825.
Class I laser products are not considered to be hazardous. The laser system and printer are designed so there is never any human access to laser radiation above a Class I level during normal operation, user maintenance, or prescribed service condition.

Warning >> Never operate or service the printer with the protective cover removed from Laser/Scanner assembly. The reflected beam, although invisible, can damage your eyes. When using this product, these basic safety precautions should always be followed to reduce risk of fire, electric shock, and injury to persons.



1.2 Caution for safety

1.2.1 Noxious Material Precaution

The toner in a printer cartridge contains a chemical material, which may harm human body if it is swallowed. Please keep children out of reach of the toner cartridge.

1.2.2 Electric Shock or fire Precaution

It is possible to get electric shock or burn by fire if you don't fallow the instructions of the manual.

(1) Use exact voltage. Please use an exact voltage and wall socket. If not, a fire or an electric leakage can be caused.
(2) Use authorized power cord. Do use the power cord supplied with PRINTER. A fire can happen when over current flows in the power cord.
(3) Do not insert many cords in an outlet. A fire can be occurred due to flow over current in an outlet.
(4) Do not put water or extraneous matter in the PRINTER. Please do not put water, other liquid, pin, clip, etc. It can cause a fire, electric shock, or malfunction. If this occurs, turn off the power and remove the power plug from outlet immediately.
(5) Do not touch the power plug with wet hand. When servicing, remove the power plug from outlet. Do not insert or take off it with wet hand. Electric shock can be occurr.
(6) Caution when inserting or taking off the power plug. The power plug has to be inserted completely. If not, a fire can be caused due to poor contact. When taking off the power plug, grip the plug and take it off. If grip the line and pull over, it could be damaged. A fire or electric shock could happen.
(7) Management of power cord. Do not bend, twist, or bind it and place other materials on it. Do not fix with staples. If the power cord gets damaged, a fire or electric shock can happen. A damaged power cord must be replaced immediately. Do not repair the damaged part and reuse it. A repaired part with plastic tape can be cause a fire or electric shock. Do not spread chemicals on the power cord. Do not spread insecticide on the power cord. A fire or electric shock can be happen due to thinner(weak) cover of the power cord.
(8) Check whether the power outlet and the power plug are damaged, pressed, chopped, or blazing fire or not. When such inferiorities are found, repair it immediately. Do not make it pressed or chopped when moving the machine.
(9) Caution when there is thundering or lightning, and being flash of lightening. It causes a fire or electric shock. Take the power plug off there is thunder. Do not touch cable and device when thundering and flash of lightening.
(10) Avoid the place where is moisture or has dust. Do not install the printer where lots of dust or around humidifier. A fire can occurred. A plug part need to clean well with dried fabric to remove dust. If water drops are dripped on the place covered with dust, a fire can occurred.
(11) Avoid direct sunlight. Do not install the printer near window where direct contacts to the sunlight. If the machine contacts sunlight long time, the machine cannot work properly because inner temperature of the machine is getting hotter. A fire can occur.
(12) Turn off the power and take off the plug when smoke, strange smell, or sound from the machine. If you keep using it, a fire can be occurred.
(13) Do not insert steel or metal piece inside/outside of the machine. Do not put steel or metal piece into a ventilator. An electric shock could happened.

1.2.3 Handling Precautions

If you ignore this information, you could harm machine and could be damaged.

(1) Do not install it on different levels, or slanted floor.
Please confirm whether it is balanced or not after installation. If it is unbalanced, an accident can be happened due to the machine falling over.
(2) Be careful not to insert a finger or hair in the rotating unit.
Be careful not to insert a finger of hair in the rotating unit (motor, fan, paper feeding part, etc) while the machine is operating. Once it happens, you could be harmed.
(3) Do not place a pot containing water/chemical or small metals. If they got caught into the inner side of machine, a fire or electric shock can be occurred.
(4) Do not install it where lots of moisture or dust exists or where raindrop reaches. A fire or electric shock can be caused.
(5) Do not place a candlelight, burning cigarette, and etc. on the machine. Do not install it near to heater. A fire can be occurred.

1.2.4 Assembly/Disassembly precaution

When replacing parts, do it very carefully. Memorize the location of each cable before replace parts for reconnecting it afterwards. Do memorize. Please perform the steps below before replace or disassembly the parts.

(1) Check the contents stored in the memory. All the information will be erased after replacing main board. The information needed to keep has to be written down.
(2) Before servicing or replacing electric parts, take off a plug.
(3) Take off printer cables and power cord connected to printer.
(4) Do use formal parts and same standardized goods when replacing parts.Must check the product name, part cord, rated voltage, rated current, operating temperature, etc.
(5) Do not give an over-force when release or tighten up the plastic parts.
(6) Be careful not to drop the small parts such as screws in the printer.
(7) Be careful not to change the location of small parts such as screws when assembling and disassembling.
(8) Do remove dust or foreign matters completely to prevent fire of tracking, short, or etc.
(9) After finished repair, check the assembling state whether it is same as before the repair or not.

1.3 ESD Precautions

Certain semiconductor devices can be easily damaged by static electricity. Such components are commonly called "Electrostatically Sensitive (ES) Devices", or ESDs. Examples of typical ESDs are: integrated circuits, some field effect transistors, and semiconductor "chip" components.
The techniques outlined below should be followed to help reduce the incidence of component damage caused by static electricity.

Caution >>Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

1. Immediately before handling a semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, employ a commercially available wrist strap device, which should be removed for your personal safety reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ESDs, place the assembly on a conductive surface, such as aluminum or copper foil, or conductive foam, to prevent electrostatic charge buildup in the vicinity of the assembly.
3. Use only a grounded tip soldering iron to solder or desolder ESDs.
4. Use only an "anti-static" solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ESDs.
5. Do not use Freon-propelled chemicals. When sprayed, these can generate electrical charges sufficient to damage ESDs.
6. Do not remove a replacement ESD from its protective packaging until immediately before installing it. Most replacement ESDs are packaged with all leads shorted together by conductive foam, aluminum foil, or a comparable conductive material.
7. Immediately before removing the protective shorting material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.
8. Maintain continuous electrical contact between the ESD and the assembly into which it will be installed, until completely plugged or soldered into the circuit.
9. Minimize bodily motions when handling unpackaged replacement ESDs. Normal motions, such as the brushing together of clothing fabric and lifting one's foot from a carpeted floor, can generate static electricity sufficient to damage an ESD.

2. Product specification and feature

2.1 Product Specifications

2.1.1 Product Overview

Up to 33ppm (Ltr. 35ppm)

PCL6, PS3, 1200x1200dpi

400 MHz, 64MB Standard

- 10/100 Base TX
- Opt. 802.11b/g Wireless N/W

ML-3471ND

USB 2.0, IEEE1284

10K Toner (4K Standard)

Built in Duplex

- 250 sheet Cassette
- 50 sheet MP
- 250 sheet Opt. SCF

2.1.2 Specifications

• Product Specifications are subject to change without notice. See below for product specifications.

2.1.2.1 General Print Engine

ML-347x Series		ML-3470D	ML-3471ND
Engine Speed	Simplex	Up to 33 ppm in A4 (35 ppm in Letter)	
	Duplex	Up to 17 ipm in A4 (17.5 ipm in Letter)	
Warmup time	From Sleep	Less than 15 sec, Cold warm-Up time : 15sec	
FPOT	From Ready	Less than 8.5 sec	
	From Idle	Less than 23.5 sec	
	From Coldboot	Less than 30 sec	
Resolution	-	Up to 1,200 x 1,200 dpi effective output	

2.1.2.2 Controller & S/W

ML-347x Series		ML-3470D	ML-3471ND
Processor		Samsung 400 MHz	
Memory	Std.	32 MB	64 MB
	Max.	288 MB	320 MB
Printer Languages	-	PostScript3, PCL6, SPL, IBM ProPrinter, EPSON	
Fonts	-	45 scalable, 1 bitmap, 136 PostScript3 fonts	
Driver	Default Driver	SPL	
	Supporting OS	Windows 2000/XP/2003/Vista	
		Various Linux OS including Red Hat, Caldera, Debian, Mandrake, Slackware, SuSE and Turbo Linux	
		Mac OS 8.6~9.2/10.1~10.4	
	WHQL	Windows XP/2000/2003	
	Compatibility	PCL6: Win95/98/NT4.0/2000/Me/XP/2003 PS3: Win9x/NT4.0/2000/Me/XP/2003 PPD, Mac PPD, Linux PPD KS/KSSM: DOS	
Wired Network	Protocol	External : SPX/IPX, TCP/IP, SNMP, HTTP 1.1	
	Supporting OS	Microsoft Windows 98/ME/2000/XP/2003 Microsoft Windows NT 4.xMac OS 8.6 and aboverVarious Linux OS including Red Hat, Caldera, Debian, Mandrake, Slackware, SuSE and Turbo LinuxNovell 4.x,5.x,6.x	
Wireless Network	Protocol	External : SPX/IPX, TCP/IP, SNMP, HTTP 1.1	
	Supporting OS	Microsoft Windows 98/ME/2000/XP/2003 Microsoft Windows NT 4.xMac OS 8.6 and aboverVarious Linux OS including Red Hat, Caldera, Debian, Mandrake, Slackware, SuSE and Turbo LinuxNovell 4.x,5.x,6.x	
Application	RCP	N/A	
	Status Monitor	N/A	
	Smart Panel	YES (RCP,SM)	
	Network Management	SAS (Samsung Admin Service), SetIP	
Interface			
Parallel	-	IEEE 1284	
USB	-	USB 2.0	
Wired Network	-	N/A	Ethernet 10/100 Base TX (Internal)
Wireless Network	-	N/A	Optional (Internal) 802.11b/g Wireless LAN (Internal)
User Interface			
LCD	-	2 x 16 Character without backlit	
Key	-	8 Key: Stop, Toner Save, Duplex < , OK, >, Menu, Back	

2.1.2.3 Paper Handling

ML-347x Series		ML-3470D	ML-3471ND
Standard Capacity	-	250-sheet Cassette Tray, 50-sheet Multi Purpose Tray @ 75g/㎡	
Max. Capacity	-	550 sheets @ 75g/㎡	
Printing	Max. Size	216 x 356 mm (8.5" x 14")	
	Min. Size	76 x 127 mm (3.0" x 5.0")	
Multi-purpose tray			
Capacity	-	50 sheets @ 75g/㎡ (20lb bond)	
Media sizes	-	A4, A5, A6, Letter, Legal, Folio, Oficio, Executive,ISO B5, JIS B5, 3"x5",Monarch, No.10, DL, C5, C6	
Media type	-	Plain Paper, Transparency, Envelope, Labels, Post Card, Card stock	
Media weight	-	16~43lb (60 to 163g/㎡)	
Sensing	-	Paper empty sensor	
Standard Cassette Tray			
Capacity	-	250 sheets @ 75g/㎡	
Media sizes	-	A4, A5, Letter, Legal, Executive, Folio, Oficio, ISO B5, JIS B5	
Media types	-	Plain paper, Thick, Thin, Recycled, Archive	
Media weight	-	16~28lb (60 to 105g/㎡)	
Sensing	-	Paper empty sensor	
Optional Cassette Tray			
Capacity	-	250 sheets @ 75g/㎡	
Media sizes	-	A4, A5, Letter, Legal, Executive, Folio, Oficio, ISO B5, JIS B5	
Media types	-	Plain paper, Thick, Thin, Recycled, Archive	
Media weight	-	16~28lb (60 to 105g/㎡)	
Sensing	-	Paper empty sensor	
Output Stacking			
Capacity	Face-Down	150 sheets @ 75g/㎡	
	Face-Up	1 sheet @ 75g/㎡	
Output Full sensing	-	N/A	
Duplex			
Supporting	-	Built-in	
Media sizes	-	A4, Letter, Legal, Folio, Oficio	
Media types	-	Plain Paper	
Media weight	-	20~24lb (75 to 90g/㎡)	

2.1.2.4 Consumables

ML-347x Series		ML-3470D	ML-3471ND
Toner	Black	4,000 pages @ ISO 19752 Coverage(Standard 4,000 pages, High Yield 10,000 pages)	
	Key	Electronic key(CRUM) Only	
	Life detect	Toner gauge sensor by dot count	
Drum	Yield	12,000 Images	

2.1.2.5 Reliability & Service

ML-347x Series		ML-3470D	ML-3471ND
Printing Volume (SET AMPV)	-	9,200 sheets-per year / 767 sheets-per month / 38 sheets-per day	
5.2 Max. Monthly Duty	-	35,000 sheets	
5.3 MPBF	-	100,000 sheets	
5.4 MTTR	-	30 min.	
5.5 SET Life Cycle	-	250,000 sheets or 5 years (whichever comes first)	
5.6 RDS	Comm. Mode	Yes	
	Operation	Yes	

2.1.2.6 Environment

ML-347x Series		ML-3470D	ML-3471ND
Acoustic Noise Level (Sound Power/Pressure)	Printing	Less than 52.0 dBA	
	Standby	Less than 26.0 dBA	
	Sleep	Back Ground Level	
Power Consumption	Ready	Less than 130W	
	AVG.	Less than 400W	
	Max/Peak	Less than 700W	
	Sleep/Power Off	Less than 11W / Less than 0.4W	
Dimension(W x D x H)	SET	400 x 433.4 x 285 mm	
Weight	SET	10.5 kg (23.15 Pounds)	
	Gross	14.5kg (31.9 Pounds)	

2.1.2.7 Options

ML-347x Series		ML-3470D	ML-3471ND
*Memory	-	16 MB, 32 MB, 64 MB, 128 MB, 256MB	
Second Cassette	-	250-sheet Cassette Tray	
Wired Network	-	N/A	Ethernet 10/100 Base TX (External) - ML-00ND
Wireless Network	-	N/A	802.11b/g Wireless LAN (Internal)
Hard Disk	-	N/A	
Duplex Unit	-	Default	

* Memory : The ML-3470D or ML-3471ND has 64MB of memory which can be expanded to 320MB.

Item	Description	Model Code (order)	Size
Memory DIMM	Exlends your Printers memory capacity.	ML-00MA ML-00MB ML-00MC ML-00MD ML-MEM140	16MB 32MB 64MB 128MB 256MB

* Use only the samsung-approved DIMM.

2.1.2.8 Others

ML-347x Series		ML-3470D	ML-3471ND
Memory	Upgradable Mem. Slot	1 EA	
	Upgradable Mem. Type	100 Pin SDRAM DIMM	
	Upgradable Mem. Unit	16MB, 32MB, 64MB, 128MB, 256MB	
Sensor	Paper Empty	YES	
	Paper Size	NO	
	Media Type	NO	
	Paper Full	NO	
Service	Service Item & Period	1. Transfer Roller : 70K pages 2. Fuser Unit : 80K pages 3. Pick-up Roller : 150K pages	

2.1.3 Model Comparison Table

	SEC ML-2550	SEC ML-3050	SEC ML-3471ND	SAMSUNG ML-3560
Image				
Engine	SEC	SEC	SEC	SEC
Speed(ppm)	24ppm	28ppm	33ppm	33ppm
Processor	266MHz	400MHz	400MHz	400MHz
Resolution	1,200X1,200 dpi	1,200X1,200 dpi	1,200X1,200 dpi	1,200X1,200 dpi
FPOT	12 sec	8.5 sec	8.5 sec	10 sec
Emulation	PS3, PCL6	PCL6	PS3, PCL6	PS3, PCL6
Ram(Std.)	32MB(Max. 160MB)	16MB(Max. 272MB)	64MB(Max. 320MB)	32MB(Max. 288MB)
Interface	IEEE1284, USB 2.0	IEEE1284, USB 2.0	IEEE1284, USB 2.0	IEEE1284, USB 2.0
Duplex	Yes	Factory Option	Yes	Option
Paper Input (Capa./Type)	550 Cassette, 100 MP	250 Cassette, 50 MP 250 SCF Opt.	250 Cassette, 50 MP 250 SCF Opt.	500 Cassette, 100 MP 500 SCF Option
Os Compatibility	Win 95/98/NT/2000/ Me/XP, Mac	Win 95/98/NT/2000/ Me/XP, Linux	Win 2000/ Me/XP, Linux	Win 95/98/NT/2000/ Me/XP, Linux
Toner	10K	4K/8K	4K/10K	6K/12 K

2.1.4 Accessory List

- JC99-02059A [INA-ACCESSORY]
  - 3903-000085 [CBF-POWER CORD]
  - 6801-00761C [CARD-WARRANTY]
  - 6902-000809 [BAG PE]
  - JC46-00293A [S/W APPLICATION-CD]
  - JC46-00354A [S/W APPLICATION-CD]
  - JC68-00761B [MANUAL-REGISTRATION_FROM]
  - JC68-01579A [MANUAL-NETWORK GUIDE]
  - JC68-01584A [LABEL(P)-BLANK 90*25]
  - JC68-00690A [MANUAL-(CARD)WARRANTY CARD]
  - JC68-00761D [MANUAL-REGISTRATION]
  - JC68-01344A [MANUAL-WARRANTY CARD]
  - JC68-01563A [MANUAL-800 SEC CARD]

2.2 System Overview

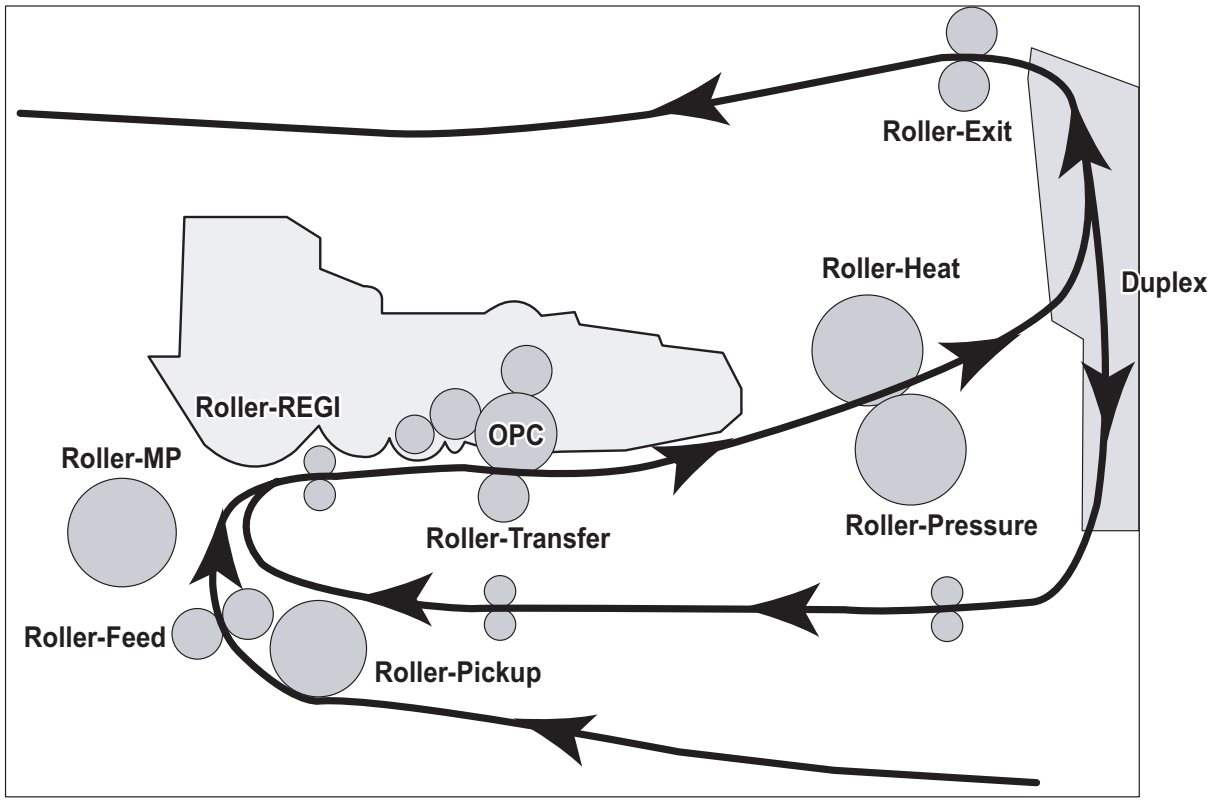
2.2.1 System Construction

2.2.1.1 SUMMARY

ML-347x Series is consisted of the Engine parts and F/W, and said engine parts is consisted of the mechanical parts comprising Frame, Feeding, Developing, Driving, Transferring, Fusing, Cabinet and H/W comprising the main control board, power board, operation panel, PC Interface.

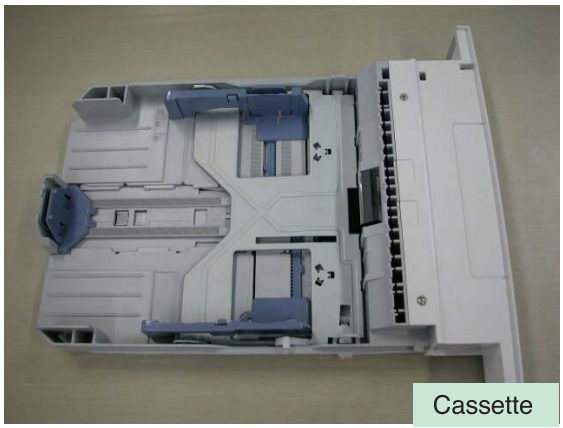
- In ML-347x Series, the main controller is consisted of Asic(SPGPv3) parts, Memory parts, Engine Interface parts and it functions as Bus Control, I/O Handling, drivers & PC Interface by CPU.
  Memory Access supports 16bit Operation, and Program Memory 32MB and Working Memory as well.
- In ML-347x Series, the paper path is consisted of 250 sheets Cassette containing friction Pad, pickup-roller, feed-roller for functioning as registration, Earth-transfer for guiding the transfer inlet, Guide-Tr for guiding sheets between transferring and fixing, Fuser, Exit Assy.
- In ML-347x Series, the driving device is consisted of f55 BLDC motor, OPC, Pick-up, Feed, Gear-Train connected with Mounting member. - to be changed

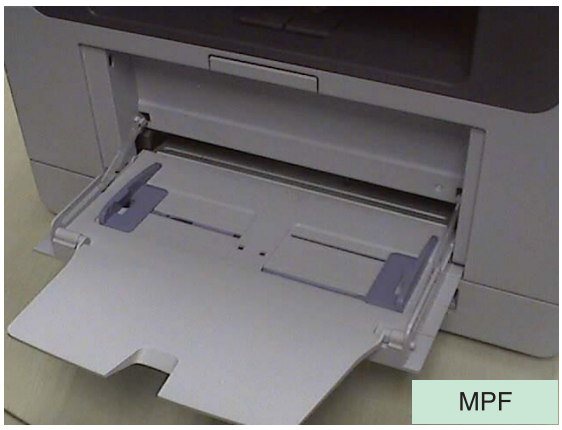
2.2.1.2 System Layout



2.2.1.2(a) Feeding Section

· Feeding Method : Universal Cassette Type
· Feeding Standard : Center Loading
· Feeding Capacity : Cassette 250 Sheets (75g/㎡, 20lb StandardPaper)


Cassette


MPF

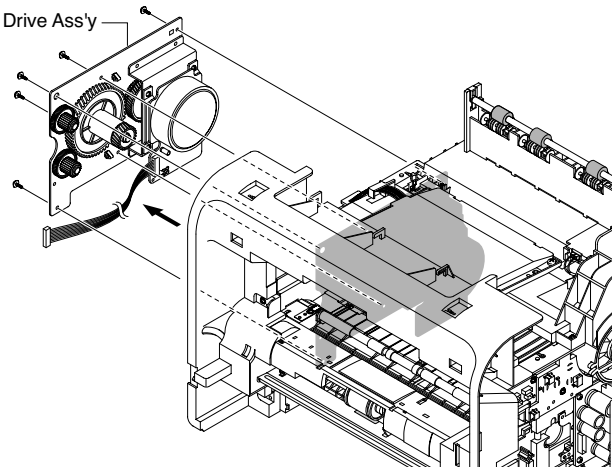
2.2.1.2(b) Transfer Ass'y

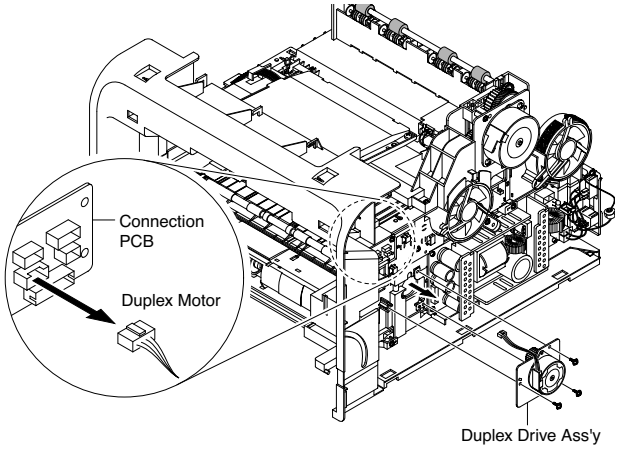
· In Warranty(Life time) : Within 70,000 sheets printing

2.2.1.2(c) Driver Ass'y

· MAIN Motor ass'y is for Cassette,MPF and Toner Cartridge

· EXIT Motor ass'y is for fuser,exit roller and the initial duplexing feeding





2.2.1.2(d) Fuser Ass'y

· Fusing Type : Lamp Type

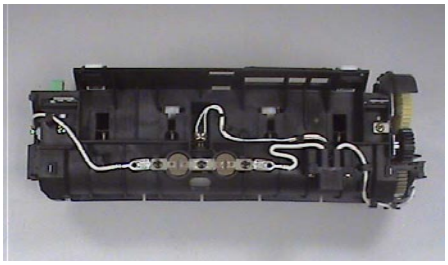
· Heat Roller : [ϕ28.3 with 0.1 Crown]

· Pressure Roller Pressure Roller 2 : [electrically conductive]

· Thermistor - Temperature Detecting Sensor

· Thermostat - Overheat Protection Device

Trouble	Temperature Control concept
Open Heat Error	50℃ below for 20sec at Warm up
Over Heat Error	-240℃ over for 2sec or 220℃ over for 20sec at ready or printing -200℃ over for 10sec at standby
Low Heat Error	Standby :130℃ below for 10sec. Printing : It 30℃ lower than target temperature for 20sec



2.2.1.2(e) LSU

· LSU is consist of LD(Laser Diode) and polygon motor control. When the controller generate the printing signal LD will turn on and Polygon motor starts.If the receiving part in LSU detect the beam and then Hsync is generated. When the rotation of poygon motor is steady, it is time of LSU ready status for printing. If either of two condition is not satisfied, LSU error is expected.

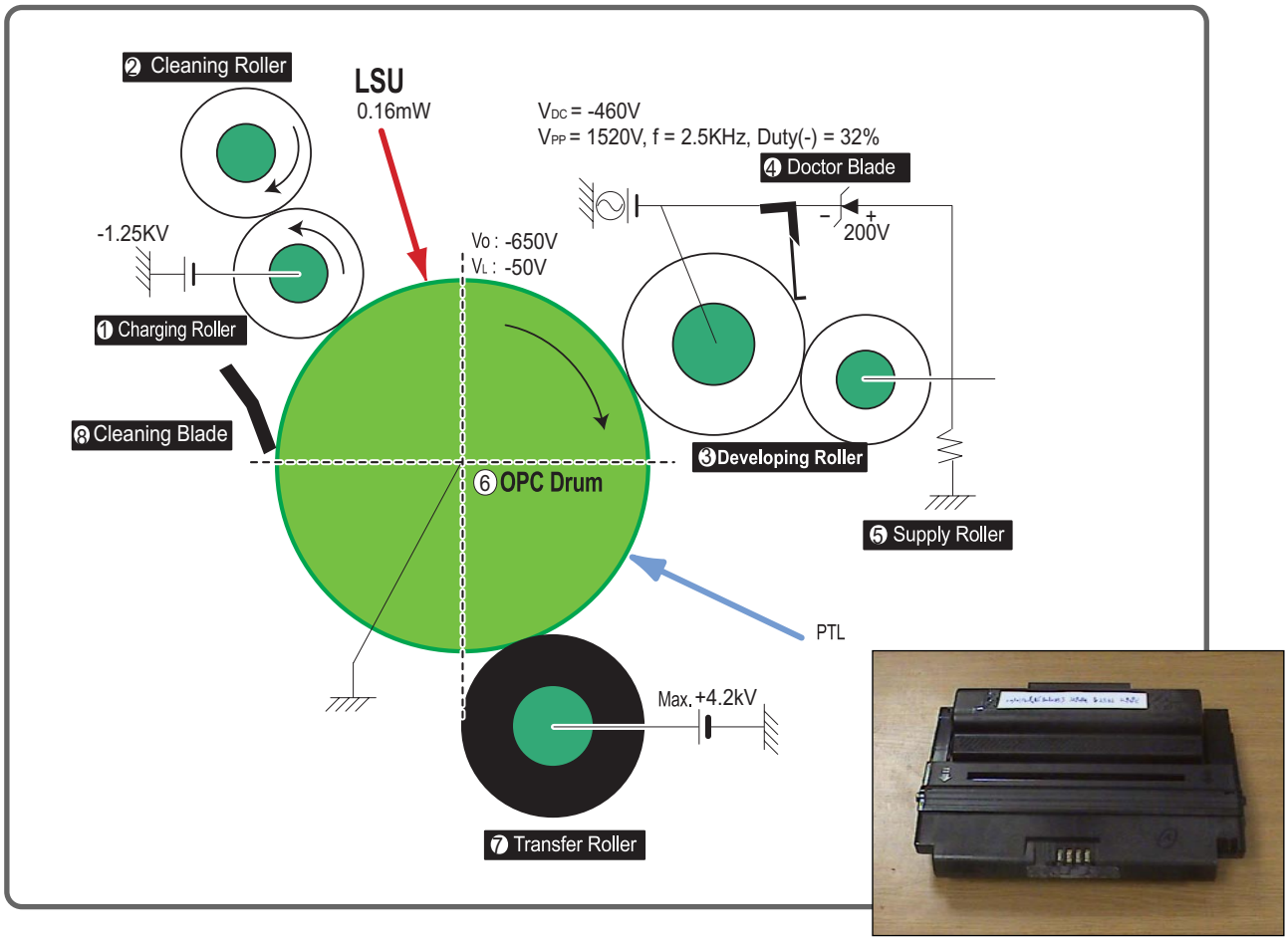
Trouble	Failure Analysis
Polygon Motor Error	No steady rotation of Polygon Motor
Hsync Error	In spite of steady rotation of Polygon Motor, There is no generation of the Hsync signal

2.2.1.2(f) Toner Cartridge

· OPC Cleaning :Mechanical Cleaning by the cleaning blade.

· The recycled toner : Trash room for the recycled toner

· No shutter for protecting the OPC Drum



2.2.1.2(g) Duplex Unit

· Duplex printing function as factory option

· Available Paper : Letter, Legal, Folio, Oficio and A4

2.21.2(h) Optional Tray (SCF)

· For customer covenience in managing paper

· Capacity : 250 sheets

2.2.2 Mechanical Parts Specifications

2.2.2.1 Frame

· Material : PC + ABS V0 NH-1000T(Cheil Industries)
· Weight : 1.0kg

2.2.2.2 Feeding Part

· Feeding Type : Universal Cassette Type
· Feeding Standard : Center Loading
· Feeding Qty : Cassette 250 sheets (75g/㎡, 20lb paper standard)
MPF 50 sheets (75g/㎡, 20lb paper standard)
Special Media 5 sheets in MPF (OHP, Envelope, Label, Post Card, Index Paper etc.)
· Separating Type : Cassette-Friction Pad Type
MPF-Friction Pad Type
· Driver Type : Driving by Gearing from Main Motor
· Pick Up Roller Driver : Solenoid
· Pick Up Roller Rubber Material : EPDM + IR μ = 1.6 or more
· Paper detecting Sensor : Photo Sensor
Paper Size Sensor : None
· Paper Separating Pad Material : NBB 52°μ = 0.8~1.2
· Separating Pad Pressure : 190gf
· Feeding Pressure (Cassette) : 250 gf ±10% (SPRING H mm, based on 1 sheet)
320 gf ±10% (SPRING H mm, based on 250 sheet)
· Paper Exit Type : Face Down
· Feed Roller Driver : Solenoid

2.2.2.3 Transfer Ass'y

It is consisted of PTL(pre-transfer lamp) and Transfer Roller. The PTL sends a light to the OPC drum, makes the current on the drum surface to low, and improve the transfer efficiency.
The transfer roller delivers the toner of the OPC drum to the paper.
· TR Voltage : +1.3KV ±5% (based on 200㏁ in accordance with media area, Transfer table)
-1.20KV ±10% (In cleaning)
· Transfer Trigger Current : 6.5㎂ ±5%
· Transfer Efficiency : 85% or more (All envirmnment : preferable media)
· Voltage System : Voltage PWM Control System
· Transfer Roller
- Material : NBR FOAM ROLL
- Structure : Mono layer
- Resistance : 3E +07 ~ 8E +07 Ω (N/N)
- Hardness : 40° ±3%° (ASKER-C)
- Validlength : 224.2 +0.5/-0mm
- OD : φ15.0 ±0.5mm
- SHAFT Material : SUM -24L + Non-electrolysis Ni. Coating
· Life Span : Print over 70,000 sheets (in 15~30℃)

2.2.2.4 Driver Ass'y

2.2.2.4(a) Motor

· Spec : BLDC Φ62 + PM Φ55 Motor (2-2 Bipolar) + PM Φ42 Motor (2-2 Bipolar)
· Pull-Out Torque:
BLDC Φ62 : 1500 gf.cm(based on actual value) or more (1342.4rpm, 1.8A)
PM Φ55 : 1490gf.cm(based on actual value) or more (711pps, 0.9A)
PM Φ42 : 240gf.cm(based on actual value) or more (1850pps, 0.6A)
· TORQUE MARGIN (Tp/o ÷Tsys) : BLDC Φ62 Motor : 1500/1100 gf.cm=1.36
PM Φ55 Motor : 1490/1053 gf.cm = 1.41
PM Φ42 Motor: 240/165 gf.cm = 1.45
· Driving Frequency: BLDC Φ62 Motor : 1342.4 rpm(1006.8 Clock)
PM Φ55 Motor : 888.75 rpm(711 pps)
PM Φ42 Motor : 1156 .25rpm(1850 pps)
· It is a power delivery unit by gearing: BLDC Φ62 Motor -> Pickup/Feeder/Developer
PM Φ55 Motor -> Fuser/Exit
PM Φ42 Motor -> Duplex

2.2.2.4(b) Process Speed

· Print Speed : 33/35 PPM (based on A4/LTR)
· Process Speed : 211.78 mm/sec
· Jitter
- Vertical : 3σ 0.018 or less in Vision System
- Horizontal : within 2% of partial magnificence error

· Orthogonality : SPEC : ± 1.0 mm or less

2.2.2.4(c) Acoustic Noise

· Warming Up : 43dB or less
· Printing : 52dB or less
· Stand-by : 26dB or less

2.2.2.5 Fixing Part (Fuser)

The fuser is consisted of the E-Coil, Heat Roller, Pressure Roller, Thermistor and Themostat.
It adheres the toner to the paper with pressure and a heat to complete the printing job.

2.2.2.5(a) Halogen Lamp

· Voltage 120V : 115 ±5%
220V : 230 ±5%
· Capacity : 800 Watt ±25W
· Temp. Distribution : 120%

2.2.2.5(b) Temperature-Interception Device (Thermostat)

· Thermostat Type : Non-Contact type THERMOSTAT
· Control Temperature : 170℃ ±5℃
· THERMOSTAT-ROLLER Gap : 1.6 ±0.2mm

2.2.2.5(c) Temperature Detecting Sensor(Thermistor)

· Thermistor Type : HF-R0060 (SEMITEC 364FL Type)
· Temperature Resistance : 7㏀(180℃)
· SYSTEM Temperature SETTING
- Stand by : 165 ±5℃
- Printing : 189 ±5℃(5 minutes before)
184 ±5℃(5 minutes after)
- Overshoot : 200℃ less
- Overheat : 210℃ less

2.2.2.5(d) Heat Roller

· Length : 247.5mm
· Valid length : 224mm
· OD : φ 28.3 + 0.05, -0.03 (Tubing incl., Crown 0.09~-0.15)
· Material : AL(AL5052) + PFA Tubing
· Thickness : 0.9mm
· Coating Material : PFA 100%
· Coating Thickness : 20um (Thickness after abrasion)
· GND Type : H/R Bearing Grounding type By SECC Fuser lower frame

2.2.2.5(e) Pressure Roller

· Shaft
- Length : 251.3mm
- Material : SUM
- Thickness : Ø6(Ø14 - RUBBER portion)

· Rubber 1
- Material : Silicon Rubber (Tubing Type : Ø20)
- Length : 226.4mm
- Thickness : 5mm(one-side)

· Rubber 2
- Material : Silicon Rubber (Tubing Type : Ø16)
- Length : 226.4mm
- Thickness : 5mm(one-side)

· OD : 1) φ20 ±0.2(Center part Crown -0.2)
2) φ16 ±0.2(Center part Crown -0.15)

2.2.2.5(f) Media Separating System

PI Coating with PPS Claw System

2.2.2.5(g) Safety Relevant Facts

· Proteciong device when overheating
- 1st protecting device : H/W cuts off when detecting an overheating
- 2st protecting device : S/W cuts off when detecting overheating
- 3st protecting device : Thermostat cuts off the power

· Safety device
- The power of Fuser is cut-off after front cover is open
- The overheating safety device for customer
- The surface temperature of the Fuser Cover is under 80 ℃

2.2.2.6 LSU (Laser Scanner Unit)

The LSU unit is controlled by video controller. It scans the video data received from video controller with laser beam by using the rotation principle of the polygon mirror to create the latent image on the OPC drum. It is the core part of LBP.

The OPC drum rotates as the same speed as the paper feeding speed. It creates the /HSYNC signal and sends it to the engine when the laser beam of the LSU reaches the end of the polygon mirror, and the engine detects the /HSYNC signal to arrange the vertical line of the image on the paper. After detecting the /HSYNC signal, the image data is sent to the LSU to arrange the its margin on the paper.

The one side of the polygon mirror is one line for scanning.

2.2.2.7 Toner Cartridge

In the toner cartridge, the OPC unit and the developer unit are in a body.

The OPC unit has OPC drum and charging roller, and the developer unit has toner, toner cartridge, supply roller, developing roller, and the blade.

2.2.2.7(a) Summary

- Developing Method : Non magnetic 1 element contacting method
- Toner : Non magnetic 1 element shatter type toner
- Charging capacity : -39.1 ±3 μ C/g (KAO meas. method)
- Average OD : 8.5 ±0.5 ㎛ (Toner)
- Toner Qty : 125 gf/250gf (4k / 10k)
- The life span of toner: 4k/10k sheets (ISO 19752 Pattern / A4 standard)
- Toner Residual Sensor : Dot count with CRUM(CRU Monitor)
- OPC Cleaning : Collect the toner by using cleaning blade+ FILM OPC
- Handling of wasted toner : Collect the wasted toner in the cleaning frame by using cleaning blade
- OPC Drum Protecting Shutter : None
- Classifying device for toner cartridge: ID is classified by interruption of the frame channel.

2.2.2.7(b) Developing Roller

- Roller type : conductive elastic roller
- Rotary Speed : 203.06 mm/sec
- Roller Bias : -220V ~ -400 ±20V
- Control Type : Bias PWM Control type
- Roller material : Conductive NBR + Surface UV process
  - Structure : Mono layer
  - Resistance : 1.0E+03~ 1.5E+06 Ω (N/N Condition)
  - Hardness : 52° ±5°
  - Valid Length : 228 mm
  - OD : φ14.07 mm ± 0.05
  - Shaft material : SUS 303
  - Surface roughness (Ra) : Ra 2.0 ~ 2.5 ㎛ (Circular-direction)
  - Friction coefficient (u) : 0.1 ~ 0.5 (70gf, 50mm/min, OHP (3M,#CG3300))
  - Life : 10,000 sheets or more

2.2.2.7(c) Supply Roller

· Rotary Speed : 131.98 mm/sec
· Roller Bias : -370V ~ -550V
· Control Type : Bias
· Roller material : Nylon Fur
- Structure : Closed cell
- Resistance : 0.6E+05 ~ 3.0E+06 Ω(N/N cond.)
- Hardness : 16 ~ 25°(Asker "C")
- Valid Length : 218 mm
- OD : φ11.2 ±0.1 mm
- Shaft material : SUM 24L Non-electrolysis Ni. Coating
- Shaft OD : φ8.2 mm + 0 / -0.05
- Driver : Gear Driver (in a direction opposed to D/R)
- Sponge Density : 0.45 , ±0.1 g/㎥
- Life : 10,000 sheets or more

2.2.2.7(d) REGULATING BLADE

· Type : Regulating toner layer by pressure
· Material : SUS 301 1/2H CSP t0.08
· Valid Length : 228mm
· Voltage : -420V ~ -600V
· Regulating edge R value : 0.3 ±0.02mm
· Pressure : 42 gf/cm

2.2.2.7(e) CHARGING PORTION

· Type : Conductive Roller Contact-Charge
· Rotary Velocity : 179.7 mm/sec
· Surface potential : -760 ±70V (based on OPC , N/N cond.)
· Residual potential : -130 V or less (initial)
· Control Type : Bias PWM Control
· Roller material : Conductive elastic roller (Conductive NBR + SBR)
- Structure : Mono layer (Surface UV process)
- Resistance : 0.75E+06 ~ 5.0E+06 (N/N cond.)
- Hardness : 50° ±3°(Asker "A")
- Length : 230 mm
- OD : φ12.0 ±0.05 mm
- Shaft Material : SUM-24L + Non-electrolysis Ni Coating
- Shaft OD : φ6 + 0 / -0.05 mm
- Driver : Gear Driver
- Pressure : L:300 gf / R:350 gf
- Roller surface roughness : Ra 1.8 um or less (shaft direction)
- Roller life : 10,000 sheets or more
· Roller Voltage : -1.25 ~ -1.70 KV

2.2.3 Engine H/W Specifications

2.2.3.1 ML-347x (PCL) Main Board

The Engine Board and the Controller Board are in one united board, and it is consisted of CPU part and print part in functional aspect. The CPU is functioned as the bus control, I/O handling, drivers, and PC interface. The main board sends the Current Image of Video data to the LSU and manages the conduct of Electrophotography for printing. It is consisted of the circuits of the motor (paper feed, pass) driving, clutch driving, pre-transfer lamp driving, current driving, and fan driving.
The signals from the paper feed jam sensor and paper empty sensor are directly inputted to the main board.

2.2.3.1(a) Asic(SPGPv3)

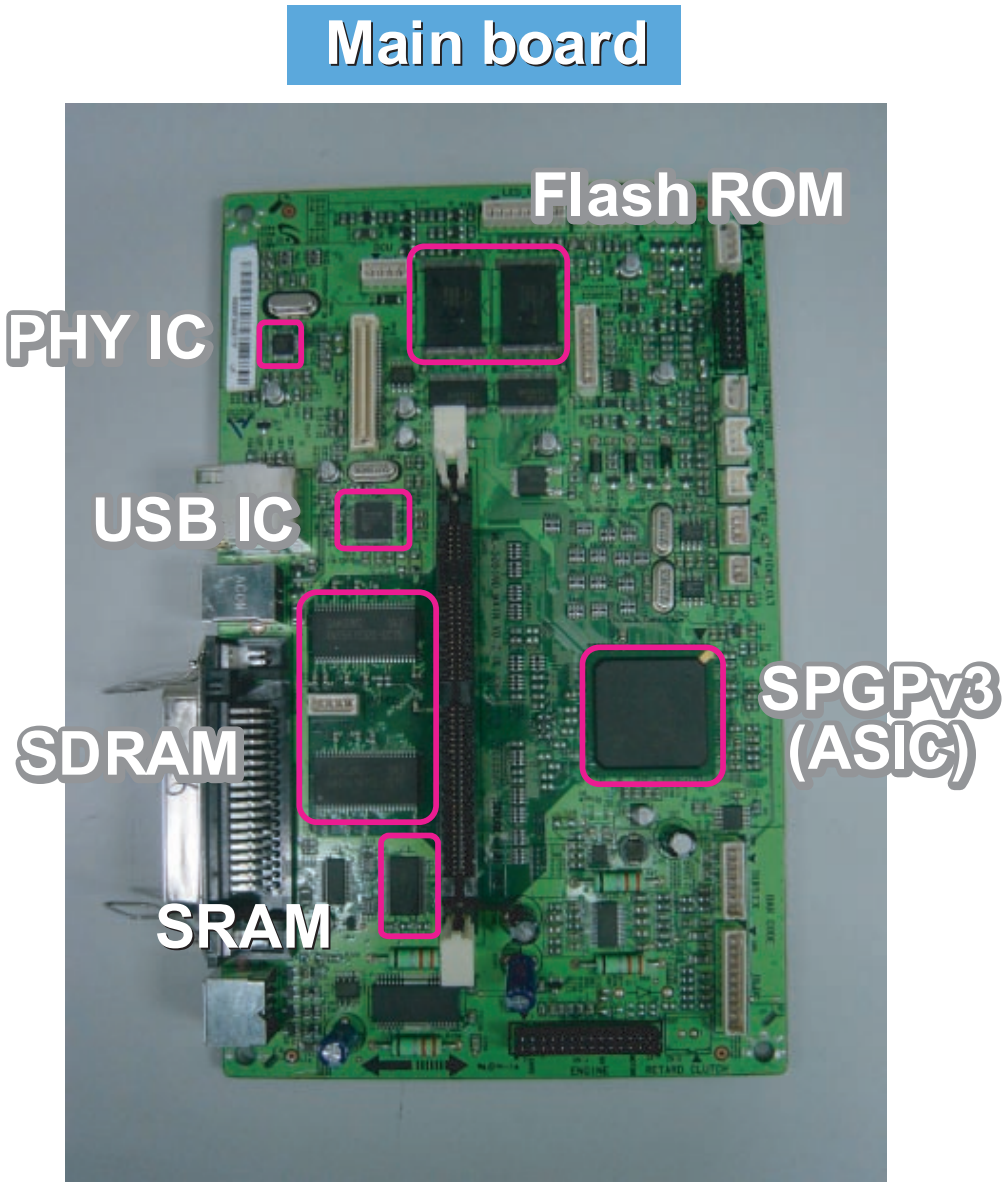
· CPU Core : ARM1020E
  - 32KB instruction cache and 32KB data cache
· Operating Frequency
  - CPU Core : over 300MHz
  - System Bus : 100MHz
· SDRAMC
  - 32Bits Only, 100MHz
  - 5 Banks (Up to 128MB per Bank)
· ROMC
  - 4 Banks (Up to 16MB per Bank)
· IOC
  - 6 Banks (Up to 16MB per Bank
· DMAC
  - 4 Channels
· HPVC
  - Dual/Single Beam
  - LVDS Pad(VDO, HSYNC)
· UART
  - 5 Channels (1 Channels Supports DMA Operation)
· PCI Controller
  - 32Bits, 33/66MHz
  - PCI Local Bus Specification rev2.2 Complaint
  - Host / Agent Mode (Support 4 Devices in Host Mode)
· NAND Flash Controller
  - 8/16Bits, H/W EEC Generation
  - Auto Boot Mode (Using Internal SRAM, 4KB)
· MAC
  - 10M/100Mbps
  - Full IEEE 802.3 Compatibility
· Engine Controller
  - LSU Interface Unit
  - Step Motor : 2 Channels
  - PWM : 8 Channels
  - ADC : 6 Channels
· I2C Controller
  - I2C(S-BUS) Slave Device Support(I2C Version 2.1)
· RTC
  - RTC Core Voltage : 3V
· PLL
  - 3 PLL : MAIN, PCI, PVC

2.2.3.1(b) Memory

· Flash Memory : It stores System Program and downloads the System Program through PC Interface, and in case of model for export it compresses the PCL font, then stores it.
  - Capacity : 32M Byte (NAND Flash)
  - Random Access Time : 10 us (Max)
  - Serial Page Access Time : 50ns (Min)
· DRAM : It is used as Swath Buffer, System Working Memory Area, etc. when printing.
  It stores Font List, compressed into Flash memory, on DRAM and uses it as PCL font in case of model for export.
  - Capacity : 64M Byte(Basic), up to 320Mbyte (User Option)
  - Type : SDRAM 100MHz/133MHz , 16bit

2.2.3.1(c) Others

The Option PBA can be mounted for supporting the serial communication.



2.2.3.1(d) Flash Memory

It stores the system program and downloads system program through the PC Interface.
- Capacity : 16M Byte (NOR Flash)
- Access Time : 90ns
- Page read Time : 25ns

2.2.3.1(e) SDRAM

It is used as swath buffer, system working memory area, etc. while Printing.
- Capacity : The 64M Bytes is for this model (64M : Printing System Working Memory Area)

2.2.3.1(f) Sensor Input Circuit

■ **Paper Empty Sensing**

The Paper empty sensor (Photo Interrupter) on the HVPS informs the state of paper to CPU whether it is empty or not with operation of the actuator.
When cassette is empty, it detects the fact by reading the E20 of CPU, and then informs the fact by displaying the RED.

■ **MP Sensing**

By operation of Actuator on the frame, an individual MP Sensor (Photo interrupter) informs the state of paper to CPU whether it is empty or not. It reads the D17 of CPU for recognizing paper in MP, and paper is fed from MP if there is.

■ **Paper Feeding/With Toner Cartridge Sensing**

When paper passes the actuator (feed sensor part), it detects the signal of Photo interrupter, informs the paper feeding state to CPU, and then sprays the image data after certain time.
If it doesn' t detect the feed sensor within 1sec. after paper is fed, paper Jam0 is occurred (LED will be display RED color). The fact whether the developer is inserted or not is detected by CRUM. After the developer is mounted, the sub-CRUM can read the information of toner cartridge from contact with CRUM involved in toner cartridge. If the information of toner cartridge is invalid, it will show invalid sign on a LCD or LED.

■ **Paper Exit Sensing**

It detects paper state whether paper gets out from the set with operation of exit sensor on the HVPS and actuator on the frame. Paper detects the on/off time of exit sensor by reading D22 of CPU, and the normal operation or jam information is informed to the CPU.
The paper JAM2 is informed. (LED will be display RED color)

■ **Cover Open Sensing**

The Cover open sensor is located on the HVPS. After the front cover is opened, +24VS (DC fan, Solenoid, Main Motor, Polygon motor part of LSU and HVPS), which is supplied to the each unit, is cut off. The cover-open sensing is operated by the D23 of CPU.
In case, the red will be ON for informing the facts to user.

■ DC FAN / SOLENOID Driving

It is driven by transistor and controlled by D14(FAN MAIN), E16(FAN DUPLEX), C23(PICK-UP CLUTCH), C18(REGI CLUTCH), D15(MPF CLUTCH) of CPU.
When it is high, the fan is driving by turning on the TR, and it is off when the sleep mode is selected. There are three solenoids, and they are driven by paper pick-up, regi and MPF signal. It is turned on or off by C23, C18, D15 of CPU. The diode protects the driving TR from the noise pulse, which is flown when the solenoid id de-energizing.
FAN Driving Circuit is driven by Transistor, and controlled by D14, E16 of CPU.

■ Motor Driving

The main motor driving circuits is on the BLDC Motor Ass'y Unit. Main Controller has the interfacing circuits. There is motor driver IC on the motor control board of Motor Ass'y Unit.

The exit motor driving circuits is formed when the driver IC is selected. The AN44060A Motor Driver IC is used in this case. The resistance Rs value for sensing and voltage value for the V reference can be changed by motor driving voltage value. The motor driving voltage is calculated with the following formula.

IN 0, 2	IN 1, 3	Output Current
L	L	Vref / (10*Rs) = Iout
H	L	Vref / (15*Rs) = Iout * 2/3
L	H	Vref / (30*Rs) = Iout * 1/3
H	H	0

The motor driving circuit is formed when the Driver IC is selected. The A3977 Motor Driver IC is used in this case. The resistance Rs value for sensing and voltage value for the V reference can be changed by motor driving voltage value. The motor driving voltage is calculated with the following formula.
I = Vref / Rs, wherein Vref is (R1 ×5V) / (R1+R2).

2.2.3.2 SMPS & HVPS board

The SMPS supplies DC Power to the System.
It takes 110V/220V and outputs the +5V, +24V to supply the power to the main board. The HVPS board creates the high voltage of THV/MHV/Supply/Dev and supplies it to the developer part for making best condition to display the image. The HVPS part takes the 24V and outputs the high voltage for THV/MHV/BIAS, and the outputted high voltage is supplied to the toner, OPC cartridge, and transfer roller.

2.2.3.2(a) HVPS (High Voltage Power Supply)

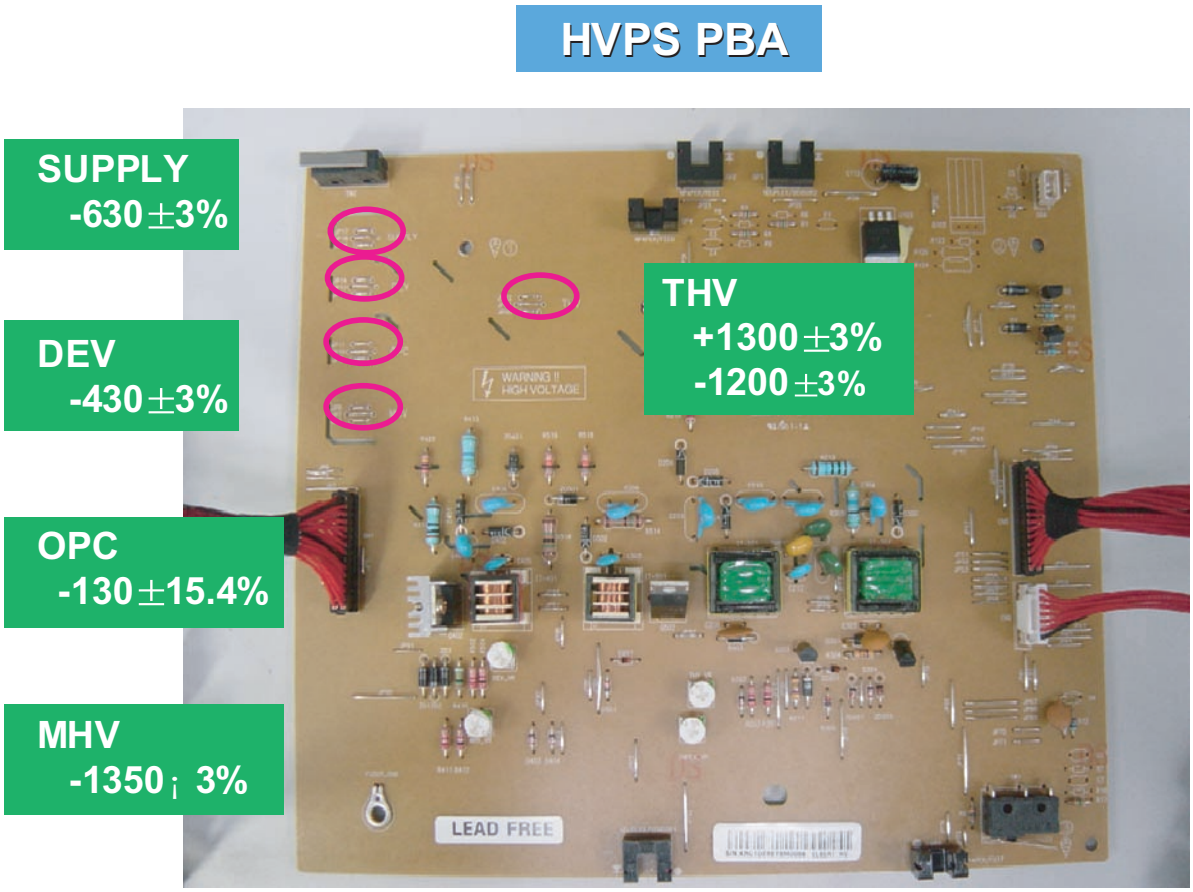
· Transfer High Voltage (THV+)
- Input Voltage : 24 V DC ± 15%
- Output Voltage : MAX +5.0KV ± 5 %,(Duty Variable, no loading)
  ->1.2KV ±15% (when cleaning,200 MΩ)
- Output Voltage Trigger : 6.5 μA
- Input contrast of the Voltage stability degree :under ± 5 % (fluctuating input 21.6V ~26.4V)
  Loading contrast : ± 5 % or less
- Output Voltage Rising Time : 100 ms Max
- Output Voltage Falling Time : 100 ms Max
- Fluctuating transfer voltage with environmental various : +650 V(Duty 10%) ~ 5 KV (Duty 90%)
- Environment Recognition Control Method : The THV-PWM ACTIVE is transfer active signal. It detects the resistance by recognizing the voltage value, F/B, while permits the environmental recognition voltage.
- Output Voltage Control Method : Transfer Output Voltage is outputted and controlled by changing Duty of THVPWM Signal. 10% Duty : +650V, 90% Duty : +5KV ±5%

· Charge Voltage (MHV)
- Input Voltage : 24 V DC ± 15%
- Output Voltage : -1.3KV ~ -1.8KV DC ± 50V
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Output Loading range : 30 MΩ ~ 1000 MΩ
- Output Control Signal(MHV-PWM) : CPU is HV output when PWM is Low

· Cleaning Voltage (THV-)
- The (+) Transfer Voltage is not outputted because the THV PWM is controlled with high.
- The (-) Transfer Voltage is outputted because the THV-Enable Signal is controlled with low
- The output fluctuation range is big because there is no Feedback control.

· Developing Voltage (DEV)
- Input Voltage : 24 V DC ± 15%
- Output Voltage: -200V ~ -600V DC ±20 V
- Output Voltage Fluctuation range: PWM Control
- Input contrast of the output stability degree : ± 5 % or less
  Loading contrast : ± 5 % or less
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Output Loading range : 10MΩ ~ 1000 MΩ
- Output Control Signal (BIAS-PWM) : the CPU output is HV output when PWM is low.

· Supply
- Output Voltage : -400 V ~ -800V DC ±50 V(ZENER using, DEV)
- Input contrast of the output stability degree : under ± 5 %
  Loading contrast : ± 5 % or less
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Output Loading range : 10 MΩ ~ 1000 MΩ
- Output Control Signal (BIAS-PWM) : the CPU is HV output when PWM is low.



2.2.3.2(b) SMPS (Switching Mode Power Supply)

It is the power source of entire system. It is assembled by an independent module, so it is possible to use for common use. It is mounted at the side of the set.
It is consisted of the SMPS part, which supplies the DC power for driving the system, and the AC heater control part, which supplies the power to fuser. SMPS has two output channels. Which are +5V and +24V.

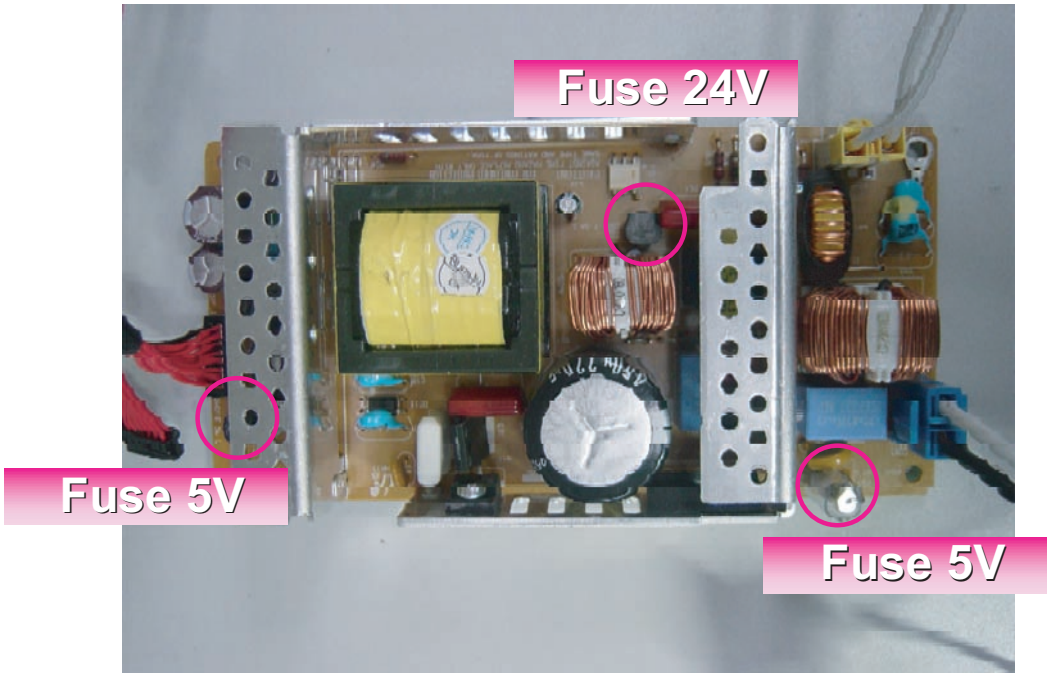
· AC Input
- Input Rated Voltage : AC 220V ~ 240V AC 110V ~ 127V
- Input Voltage fluctuating range : AC 198V ~ 264V AC 99V ~ 135V
- Rated Frequency : 50/60 Hz
- Frequency Fluctuating range : 47 ~ 63 Hz
- Input Current : Under 4.0Arms / 2.0Arms (But, the status when e-coil is off or rated voltage is inputted/outputted)

· Rated Output Power

NO	ITEM	CH1	CH2	Remark
1	CHANNEL NAME	+5V	+24.0V	
2	CONNECTOR PIN	CON 35V PIN: 11,13,15 GND PIN: 12,14,16	CON 324V PIN:3,5,7,9 GND PIN:4,6,8,10	
3	Rated Output	+5V ±5%(4.75~5.25V)	+24V ±10%(21.6~26.4V)	
4	Max. Output Current	3 A	4.4 A	
5	Peak Loading Current	3.6 A	5.3 A	1ms
6	RIPPLE NOISEVoltage	100mVp-p	Under 500mVp-p	
7	Maximum output	15W	105.6W	
8	Peak output	18W	127.2W	1ms
9	Protection for loading shortage and overflowing current	Shut down or Fuse Protection	Shut down or Output Voltage Drop	

· Consumption Power

NO	ITEM	System
1	Stand-By	Less than 130W
2	PRINTING	Less than 400W
3	Sleep-Mode	Less than 11W



· Length of Power Cord : 1830±50mm
· Power Switch : Use
· Feature
- Insulating Resistance : 100㏁ or more (at DC 500V)
- Withstanding Voltage : Must be no problem within 1 min.
(at 1000V-LV model / 1500Vac-HV model,10mA)
- Leaking Current : under 3.5mA
- Running Current : under 40A PEAK (AT 25℃, COLD START)
under 60A PEAK (In other conditions)
- Rising Time : within 2Sec
- Falling Time : over 20ms
- Surge : Bi-Wave 3kV - Normal, 6KV - Common
· Environment Condition
- Operating temperature range : 0℃~40℃
- Maintaining temperature range : -25℃~85℃
- Preserving Humidity Condition : 30% ~90% RH
- Operating atmospheric pressure range : 1atm
· EMI Requirement : CISPR ,FCC, CE, MIC, C-Tick,
· Safty Requrement :IEC950 UL1950, CSA950, C-UL,NOM, TUV, Semko, Nemko, iK, CB, CCC(CCIB), GOST, EPA, Power Save

2.2.3.2(c) FUSER AC POWER CONTROL

Fuser(e-coil) gets heat from AC power. The AV power controls the switch with the Triac, a semiconductor switch. The ON/OFF control' is operated when the gate of the Triac is turned on/off by Phototriac (insulting part).
In other words, the AC control part is passive circuit, so it turns the heater on/off with taking signal from engine control part.
When the 'HEATER ON' signal is turned on at engine, the LED of PC501 (Photo Triac) takes the voltage and flashes. From the flashing light, the Triac part (light receiving part) takes the voltage, and the voltage is supplied to the gate of Triac and flows into the Triac. As a result, the AC current flows in the e-coil, and heat is occurred.
On the other hand, when the signal is off, the PC501 is off, the voltage is cut off at the gate of Triac, the Triac becomes off, and then the e-coil is turned off.

· Triac (Q501) feature : 24A-LV model / 16A-HV model, 600V SWITCHING
· Phototriac Coupler (PC501)
- Turn On If Current : 15mA~50mA(Design: 16mA)
- High Repetive Peak Off State Voltage : Min 600V

2.2.3.3 Engine F/W

2.2.3.3(a) Control Algorithm

■ **Feeding**

If feeding from a cassette, the drive of the pickup roller is controlled by controlling the solenoid. The on/off of the solenoid is controlled by controlling the general output port or the external output port. While paper moves, occurrence of Jam is judged as below.

ITEM	Description
JAM 0	- After picking up, paper cannot be entered due to paper is not fed. - After picking up, paper entered but it cannot reach to the feed sensor in certain time due to slip, etc. - After picking up, if the feed sensor is not on, re-pick up. After re-picking up, if the feed sensor is not on after certain time, it is JAM 0. *It is a status that the leading edge of the paper doesn't pass the feed sensor. -Even though the paper reaches to the feed sensor, the feed sensor doesn't be ON. *It is a status that the leading edge of the paper already passes the feed sensor.
JAM 1	- After the leading edge of the paper passes the feed sensor, the trailing edge of the paper cannot pass the feed sensor after a certain time. (The feed sensor cannot be OFF) - After the leading edge of the paper passes the feed sensor, the paper cannot reach the exit sensor after certain time. (The exit sensor cannot be ON) *The paper exists between the feed sensor and the exit sensor.
JAM 2	- After the trailing edge of the paper passes the feed sensor, the paper cannot pass the exit sensor after certain time.

■ **Transfer**

The charging voltage, developing voltage and the transfer voltage are controlled by PWM (Pulse Width Modulation). The each output voltage is changeable due to the PWM duty. The transfer voltage admitted when the paper passes the transfer roller is decided by environment recognition. The resistance value of the transfer roller is changed due to the surrounding environment or the environment of the set, and the voltage value, which changes due to the environments, is changed through AD converter. The voltage value for impressing to the transfer roller is decided by the changed value. Each voltage value is controlled according to 3.3.3.2 Timing Chart.

■ **Fusing**

The temperature change of the heat roller's surface is changed to the resistance value through the thermistor. By converting the voltage value, which impressed to the resistance, to the digital value through the AD converter, the temperature is decided. The AC power is controller by comparing the target temperature to the value from the thermistor. If the value from the thermistor is out of controlling range while controlling the fusing, the error stated in the below table occurs.

· Open Heat Error

When the engine operates the warm-up process, if the temperature of the fixing unit is not higher than a specified temperature, the engine defines Open Heat Error. When this error is broken out, the engine stops all functions and keeps the error state. Also, the engine informs the error status of the main system. And then the error message is displayed at LCD window or LED informing the error status of the user.

· Low Heat Error

When the engine is at stand-by, printing or warm-up mode, if the temperature of the fixing unit is lower than the specified temperature at each state and the lower temperature state is maintained during the specified time, the engine defines Low Heat Error. When this error is broken out, the engine stops all functions and keeps it at the error state. Also the engine informs the error status of the main system. And then the error message is displayed at LCD window or LED informing the error status of the user.

· Over Heat Error

For overall engine state, if the temperature of the fixing unit is higher than the specified temperature and the temperature state is kept during the specified time, the engine defines Over Heat Error. When this error is broken out, the engine stops all functions and keeps it at the error state. Also, the engine informs the error status of the main system. And then the error message is displayed at LCD window or LED to inform the error status of the user.

* To recover the heat error: The heat error recovery is operated automatically when the error is only caused by Low Heat Error, not the Heat Errors in Warm-up state and the Over Heat Error. If an error happens, then the engine memorizes a present temperature. In case of Low Heat Error, the maximum heat is supplied to the fixing unit. When a specified time is elapsed, the engine detects the temperature again. If the present temperature is higher than the memorized temperature, the error is recovered. In case of Over Heat Error, no heat is supplied to the fixing unit. When a specified time is elapsed, the engine detects a present temperature again. If the present temperature is a specified degree lower than the memorized temperature, the error is recovered.

■ LSU

LSU receives the image data from PVC or HPVC and make the latent image on OPC surface.
It uses the dual beam, LD1 and LD2. But the control method of them is the same.
Just in comparison with the single beam, the dual beam has the half of lsu' s frequency.
->The frequency of the dual beam = the frequency of the single beam /2.
The errors related to LSU are as follows:

* By LReady: When the printing is started, the engine drives the polygon motor of LSU. After the specified time is elapsed, if the motor is not in a ready status, the engine detects the error that the polygon motor is not in a ready status. If this error happens, the engine stops all functions and keeps it at the error state. Also, the engine informs the error status of the main system and the error message is displayed at LCD window to inform the error status of the user.

* By Hsync: When the polygon motor is ready, the LSU sends out the signal called Hsync and used to synchronize with each image line. So, if the engine does not detect consecutively the signal for a fixed time, it defines the Hsync Error. If this error happens, the engine stops all functions and keeps it at the error state. Also, the engine informs the error status of the main system and then the error message is displayed at LCD window to inform the error status of the user.

LSU Error Recovery: If the LReady or Hsync error happens, the paper exits out beforehand. The engine mode is changed to recovery mode and the engine informs the main system of the engine mode. And the engine checks the LSU error. If the error doesn't happen, the printing job will be proceeding.

2.2.4 S/W Descriptions

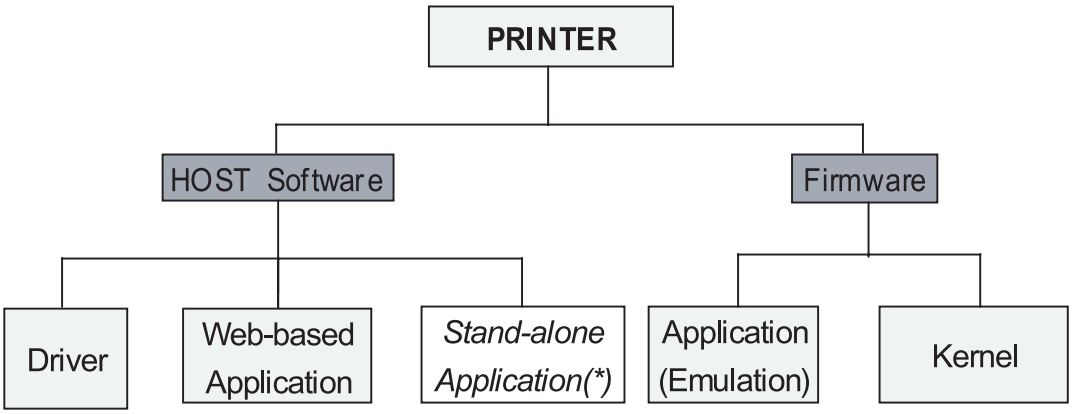
2.2.4.1 Overview

The software of Cygnus system is constructed with

1) Host Software part that the application software operated in Window and Web Environment, and

2) Firmware parts that is a Embedded software controls printing job.

2.2.4.2 Architecture



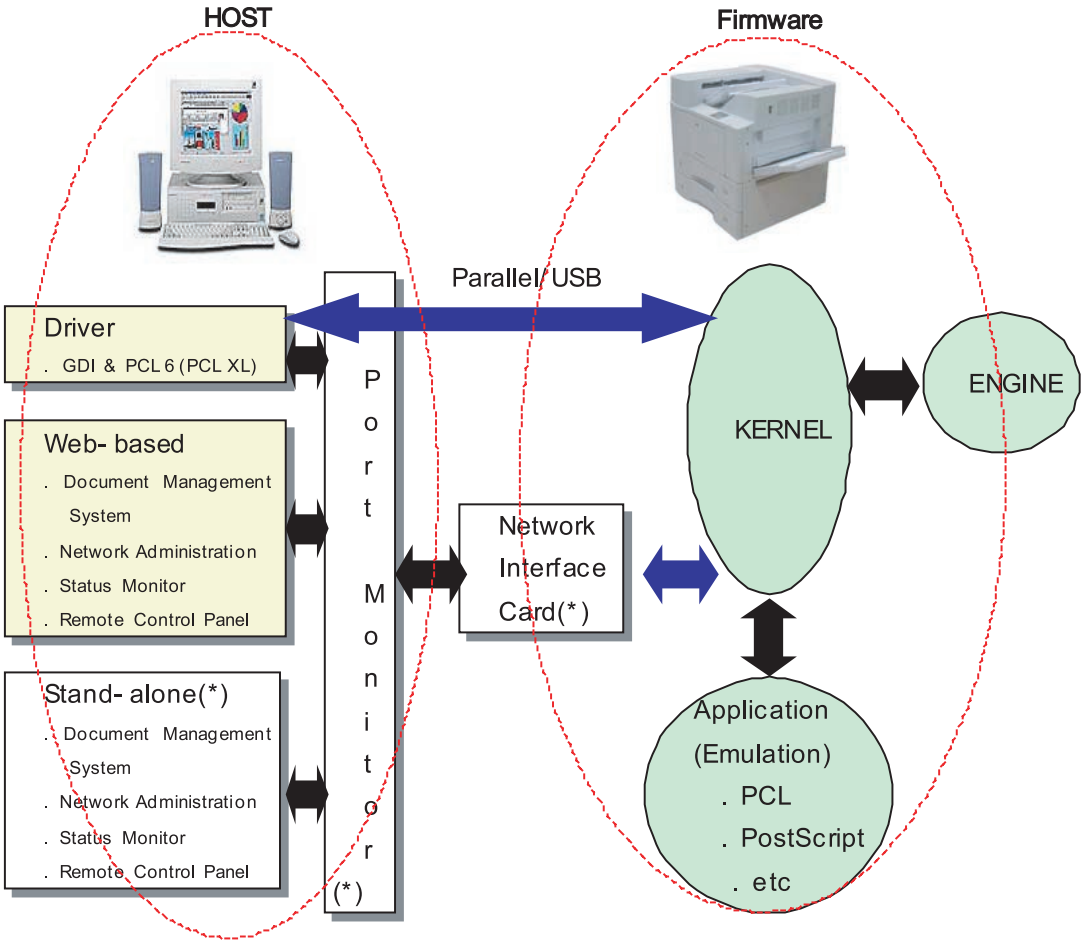
Host Software is made up of

1. Graphic User Interface that offers the various editing functions to user in Host,
2. Driver that translates the received document to a Printing Command language which printer can understand and transfers data to spooler,
3. Stand-alone Application that offers the various printing application, DMS(Document Management System), RCP(Remote Control Panel), Printer Status Monitor, Network Management in Window system,
4. Web-based-Application that offers the same functions as Stand-alone Application and RDC(Remote Diagnosis Control) in Web environment.

Firmware is made up of

1. Application (Emulation) that is a interpreter translate data received from Host to a printing language (PCL, PS, GDI, etc.) to be able to make the user to take same output as originally one what composed in Host.
2. Kernel that control and management the whole procedure include of Control flow and Printing Job before transfer to Engine system.

2.2.4.3 Data and Control Flow



The above Block Diagram is explained that:

Host Side is made up of

1. Driver that is Windows application software translate printed data to one of printer language and create spooler file,
2. Web-based Application that offer a various printer additional functions, management of printing job, printer administration, Status monitor to monitoring the printer status by real time in Web, independent environment on OS.
3. Stand-alone Application that is a similar Window software as same as above 2,
4. Port Monitor that manages the network communication between spooler and Network Interface Card, or various additional application and Network Interface Card,(this is, at first, make communication logical port, manage the data, transfer them from spooler to network port, and offer the result of printing).

Firmware Side is made up of

1. Network Interface Card is that relay the communication between Host and kernel using various network protocol,
2. Kernel is that manages the flow control of emulation procedure, receiving data from Host or Network card and printing with engine & rendering job,
3. Emulation is that interprets the various output data from selected emulation,
4. Engine is that prints rendered bit-map data to paper with required size and type by Kernel.

And then, for Job Spooling function for Multi-User, Multi-Printing that is occurred in Network printing and various additional printing functions, this Kernel use max. 10 Queuing systems in a memory.

In Printing, the two procedures are

(1) Case of using Parallel or USB Port

① After user start to print the wanted document to PCL string or compressed GDI bit-map data, Driver translate the all graphic data of it and send data to host spooler. And then the spooler sends the data stream to the printer via parallel port or USB port.

② Kernel receives this data from Host, and then select emulation fit to data and start selected one. After emulation job end, Kernel sends the output bit-map data to Engine using Printer Video Controller (by clock type for LSU).

③ Engine print the received data to required paper with the sequential developing process.

(2) Case of using Network Interface Card

① After user start to print the wanted document to PCL string or compressed GDI bit-map data, Driver translate the all graphic data of it and send data to host spooler.

② If so, Port monitor managing network port receives data from spooler and sends a data stream to the Network Interface Card.

③ Network interface card receives it and send to Kernel part,

④ Kernel receives this data from Host, and then select emulation fit to data and start selected one. After emulation job end, Kernel sends the output bit-map data to Engine using Printer Video Controller (by clock type for LSU).

⑤ Engine print the received data to required paper with the sequential developing process.

The additional printing function are realized in

(1) Web environment

(2) Window environment.

On addition, Kernel informs a status of printing status and printer status to user made printing job with the Status Monitor.

3. Disassembly and Reassembly

3.1 General Precautions on Disassembly

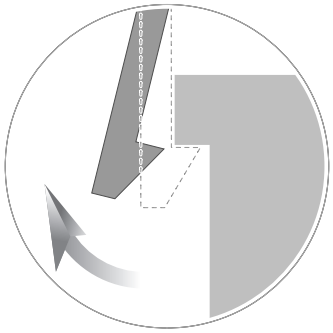
When you disassemble and reassemble components, you must use extreme caution. The close proximity of cables to moving parts makes proper routing a must.
If components are removed, any cables disturbed by the procedure must be restored as close as possible to their original positions. Before removing any component from the machine, note the cable routing that will be affected.

Whenever servicing the machine, you must perform as follows:

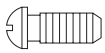
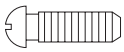
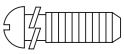
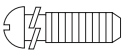
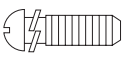
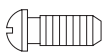
1. Check to verify that documents are not stored in memory.
2. Be sure to remove the toner cartridge before you disassemble parts.
3. Unplug the power cord.
4. Use a flat and clean surface.
5. Replace only with authorized components.
6. Do not force plastic-material components.
7. Make sure all components are in their proper position.

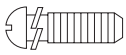
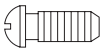
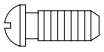
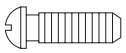
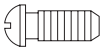
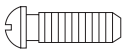
Releasing Plastic Latches

Many of the parts are held in place with plastic latches. The latches break easily; release them carefully.
To remove such parts, press the hook end of the latch away from the part to which it is latched.



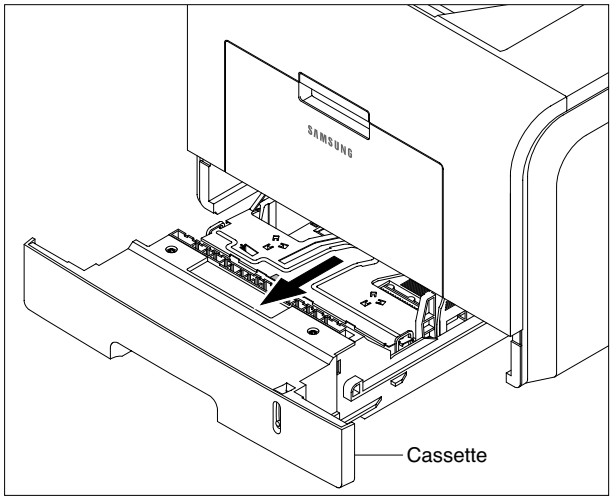
3.2 Screws used in the Printer

No.	SEC-Code	Locatioin	Description & Specification	QT'y
S1(BH Short) 	6001-000130		SCREW-MACHINE;BH,+,M3,L6,ZPC(WHT),SWRCH18A,-,-	3
			SCREW-MACHINE;BH,+,M3,L6,ZPC(WHT),SWRCH18A,-,-	2
S2(PH Long) 	6001-000568	SHIELD+PARRALLEL PORT	SCREW-MACHINE;PH,+,M3,L8,NI PLT,SWRCH18A,FP,-	2
S3(WH Long) 	6002-000440		SCREW-TAPPING;PWH,+,-,2,M3,L8,ZPC(BLK),SWRCH18A,-	4
			SCREW-TAPPING;PWH,+,-,2,M3,L8,ZPC(BLK),SWRCH18A,-	1
S4(WH Long) 	6003-000196	COVER MIDDLE+FRAME BASE	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	6
		COVER REAR	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	4
		COVER SIDE L	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	1
		COVER SIDE R	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	1
		COVER TOP	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	4
		DUP DRIVE ASS'Y+FRAME BASE	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	3
		DUP FAN+FRAME BASE	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	1
		MAIN DRIVE ASS'Y+FRAME BASE	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	6
		SHIELD CONTROLLER+FRAME BASE	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	3
		SHIELD SMPS+FRAME BASE	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	3
		Frame Base+Fuser	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	4
		frame assy	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	33
			SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	1
		FRAME MP+BRACKET FEED	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	2
		FRAME MP+HOLDER IDLE FEED	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	2
		FRAME MP+SOLENOID	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	1
			SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	3
		Frame Dup+Bracket Align Dup	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	2
		Frame Dup+Guide Upper Dup	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	4
		COVER FRONT+HOLDER LOCKER	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	2
		COVER MIDDLE+CAP SUB ACTUATOR	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	1
		PBA+COVER KEY MENU_LCD	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	4
		COVER CASSETTE+FRAME CASSETTE	SCREW-TAPTITE;PWH,+,B,M3,L10,NI PLT,SWRCH18A	2
S5(WH Long) 	6003-000221	BLDC MOTOR+BRKT MOTOR	SCREW-TAPTITE;PWH,+,-,S,M4,L8,ZPC(WHT),SWRCH18A,-	4
S6(BH Short) 	6003-000261	PLATE KNOCKUP+CAM KNOCKUP	SCREW-TAPTITE;BH,+,-,B,M3,L6,ZPC(WHT),SWRCH18A,-	1

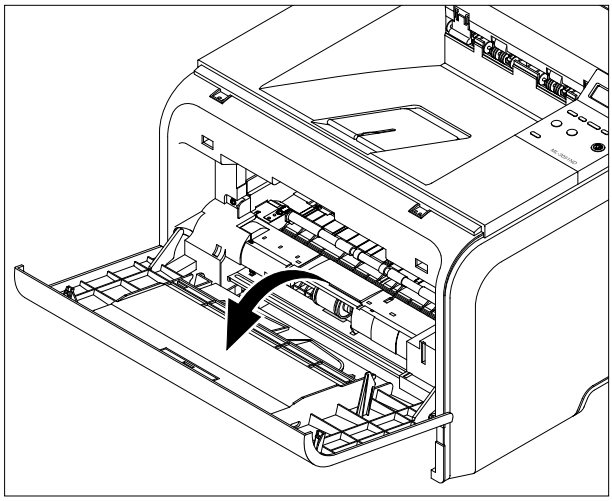
No.	SEC-Code	Locatioin	Description & Specification	QT'y
S7(WH Short) 	6003-000264	TRAY ASF INPUT UPPER+GEAR PINION	SCREW-TAPTITE;PWH,+,-,B,M3,L6,ZPC(WHT),SWRCH18A,-	1
			SCREW-TAPTITE;PWH,+,-,B,M3,L6,ZPC(WHT),SWRCH18A,-	2
		LCD+COVER KEY MENU_LCD	SCREW-TAPTITE;PWH,+,-,B,M3,L6,ZPC(WHT),SWRCH18A,-	2
		GEAR PINION+FRAME CASSETTE	SCREW-TAPTITE;PWH,+,-,B,M3,L6,ZPC(WHT),SWRCH18A,-	1
S8(BH Short) 	6003-000269	BRKT MOTOR+BRKT GEAR	SCREW-TAPTITE;BH,+,-,S,M3,L6,ZPC(WHT),SWRCH18A,-	4
		SHIELD CONTROLLER+PBA	SCREW-TAPTITE;BH,+,-,S,M3,L6,ZPC(WHT),SWRCH18A,-	3
		SHIELD SMPS+SMPS	SCREW-TAPTITE;BH,+,-,S,M3,L6,ZPC(WHT),SWRCH18A,-	4
		HVPS+SHIELD HVPS	SCREW-TAPTITE;BH,+,-,S,M3,L6,ZPC(WHT),SWRCH18A,-	3
			SCREW-TAPTITE;BH,+,-,S,M3,L6,ZPC(WHT),SWRCH18A,-	2
			SCREW-TAPTITE;BH,+,-,S,M3,L6,ZPC(WHT),SWRCH18A,-	4
S9(BH Short) 	6003-000282		SCREW-TAPTITE;BH,+,-,B,M3,L8,ZPC(BLK),SWRCH18A,-	8
			SCREW-TAPTITE;BH,+,-,B,M3,L8,ZPC(BLK),SWRCH18A,-	5
			SCREW-TAPTITE;BH,+,-,B,M3,L8,ZPC(BLK),SWRCH18A,-	10
S10(BH Long) 	6003-000301	SHIELD SMPS+EARTH HARNESS	SCREW-TAPTITE;BH,+,-,S,M4,L6,ZPC(WHT),SWRCH18A,-	1
S11(BH Short) 	6003-001256	LSU+FRAME BASE	SCREW-TAPTITE;BH,+,B,M4,L10,NI PLT,SWRCH18A	4
S12(BH Long) 	6006-001078		SCREW-TAPTITE;PH,+,WSP,B,M3,L10,ZPC(WHT),SWRCH18A,-	3

3.3 Front Cover

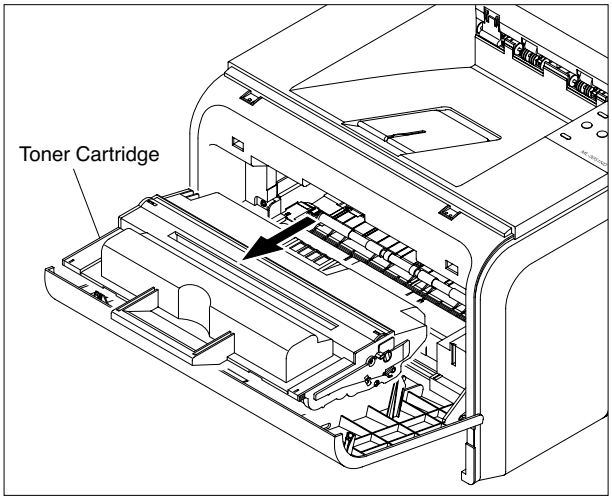
1. Take out the Cassette.



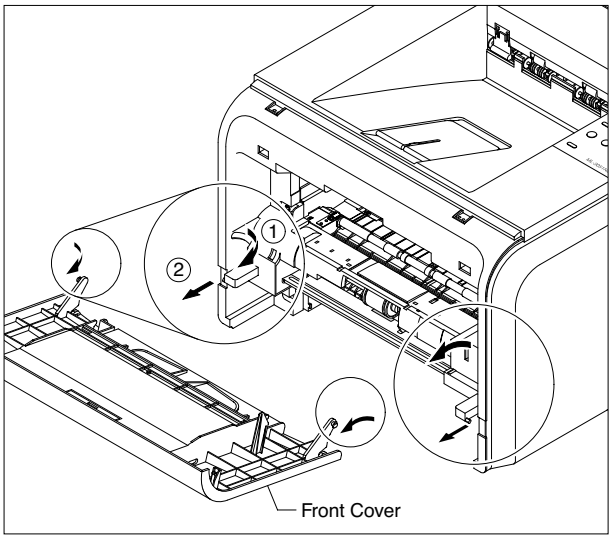
2. Open the Cover.



3. If necessary, remove the Toner Cartridge.

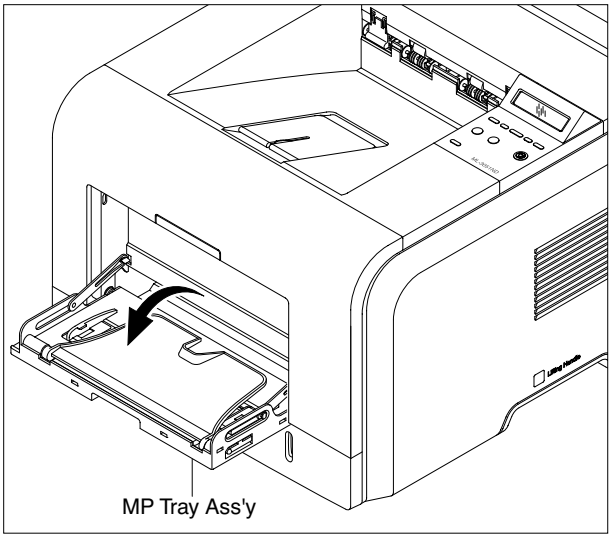


4. To remove the Front Cover, first pull the part below the both side of the Front Cover with a light pressure to the direction of arrow.

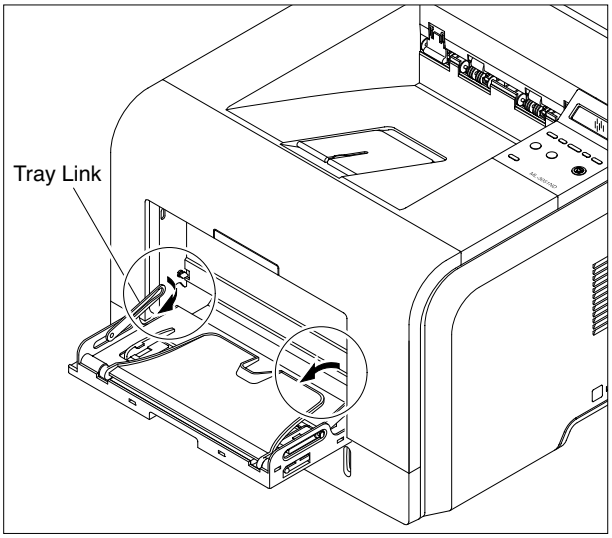


3.4 MP Tray Ass'y

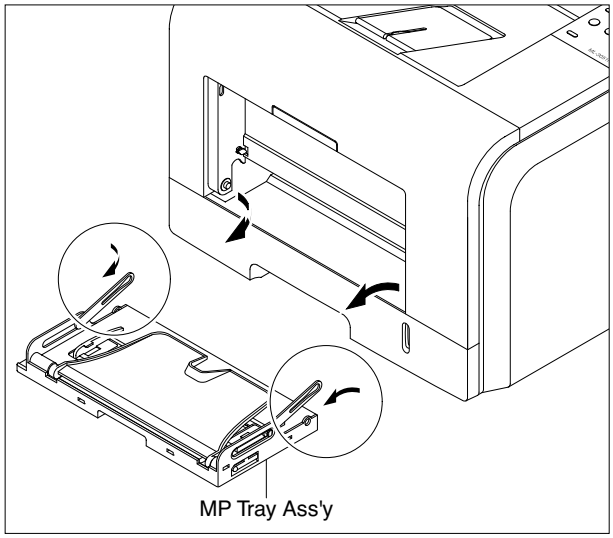
1. Open the MP Tray Ass'y



2. Pull the Tray Links from the both side of the Front Cover with a light pressure to the direction of arrow.

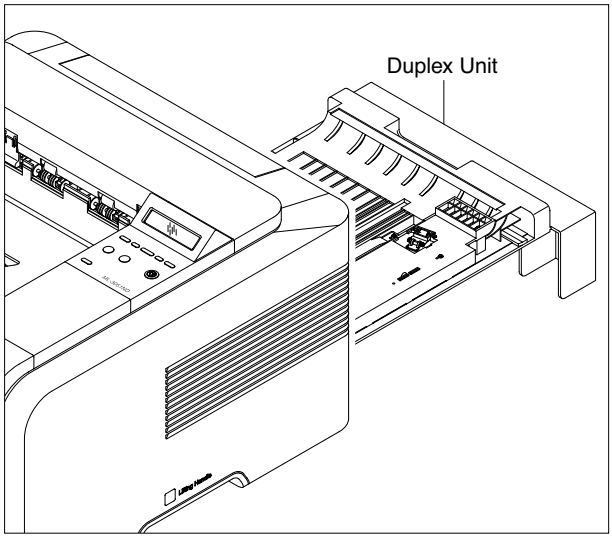


3. Apply light pressure to the both side of the MP Tray Ass'y and pull it in the direction of arrow, as shown below.

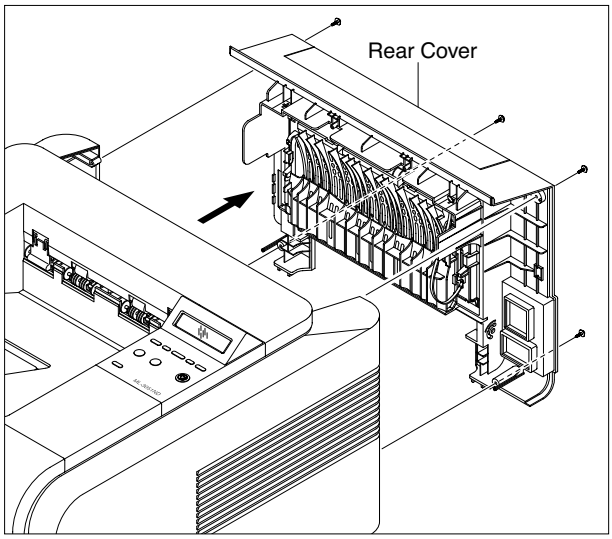


3.5 Rear Cover

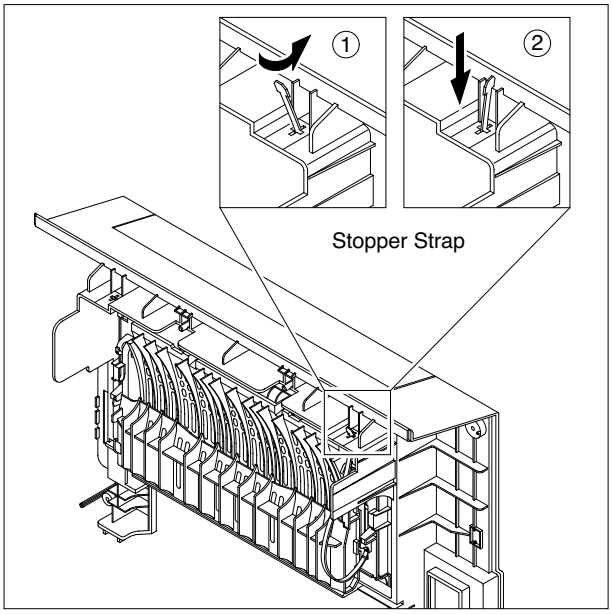
1. Take out the Duplex Unit.



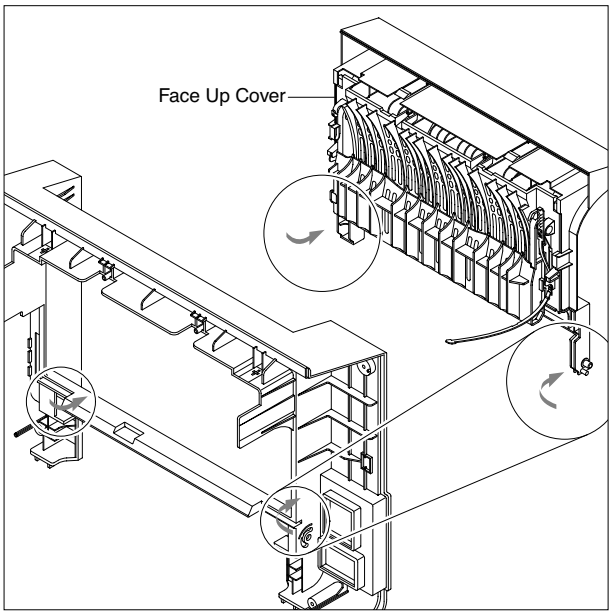
2. Remove the four screws securing the Rear Cover and then Release the Rear Cover from the Set.



3. To remove the Face Up Cover, first release the Stopper Strap in the direction of arrow.



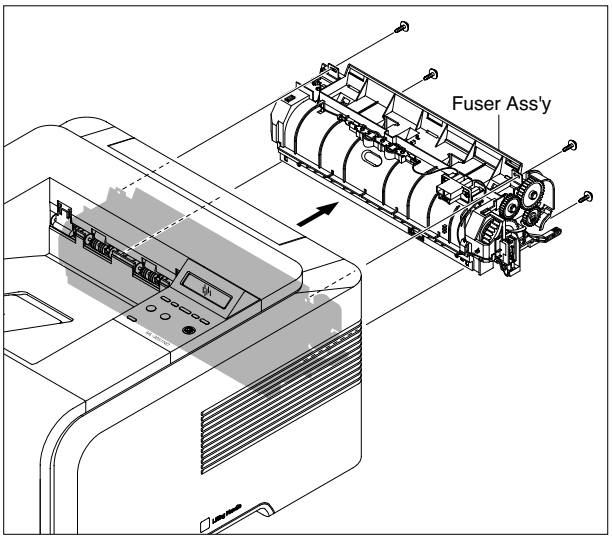
4. Unlatch the Face Up Cover from the Rear Cover and then release the Face Up Cover, as shown below.



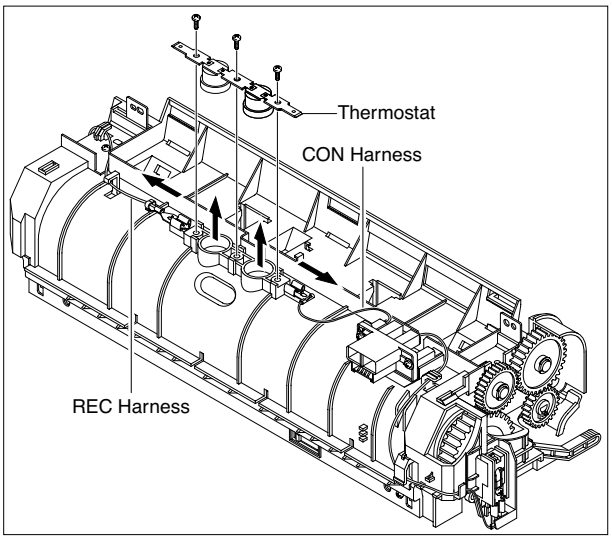
3.6 Fuser Ass'y

1. Before you remove the Fuser Ass'y, you should open the face up cover and open the guide output fuser.
   - Rear Cover (Refer to 3.5)

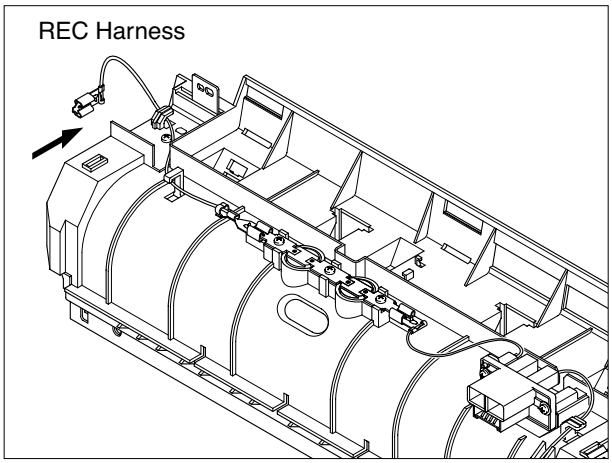
2. Remove the four screws securing the Fuser Ass'y and then pull the Fuser Ass'y.



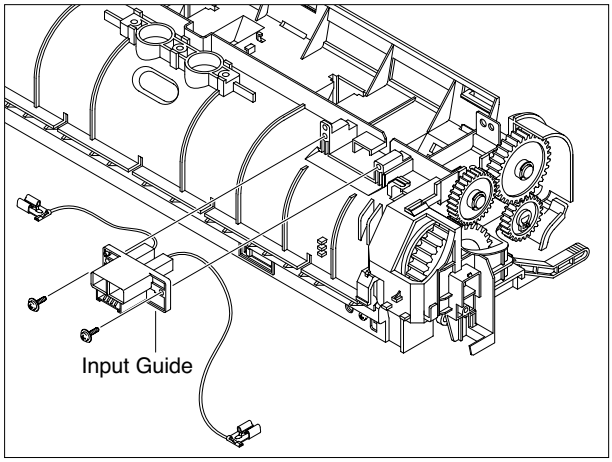
3. Release the CON Harness and REC Harness from the Thermostat and then remove the three screws securing the Thermostat and remove it.



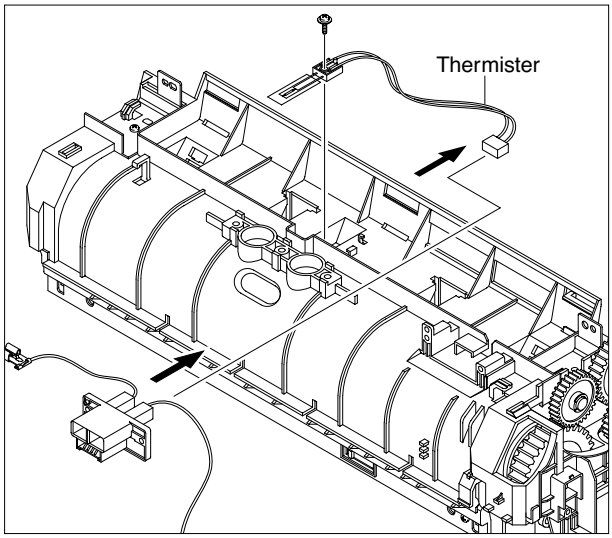
4. To remove the Electrodes, first release REC Harness from the left side of the Electrode and then release the CON Harness from the right side of the Electrode, as shown below.



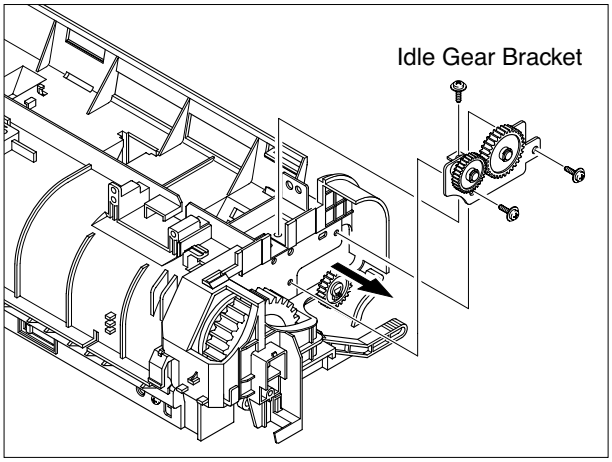
6. Remove the two screws securing the IInput Guide and remove it.



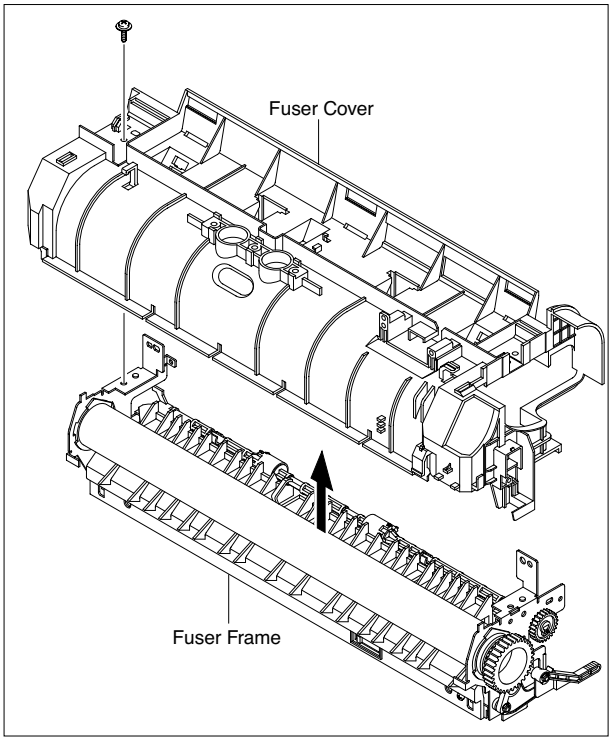
7. Unplug the connector from the Input Guide and remove the one screw securing the Thermistor and remove it.



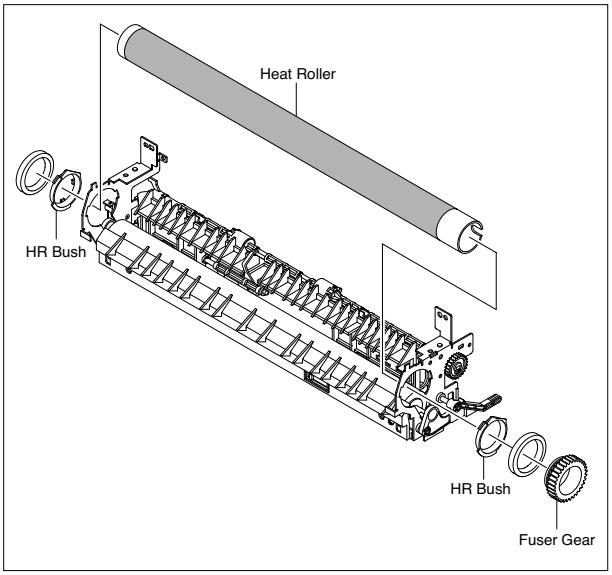
8. Remove the three screws securing the Idle Gear Bracket and remove it.



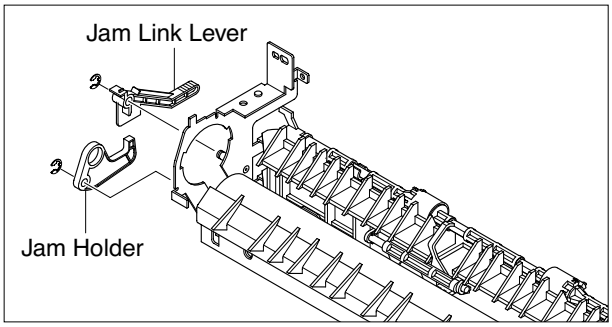
9. Remove the one screw securing the Fuser Cover and release the Fuser Cover from the Fuser Frame.

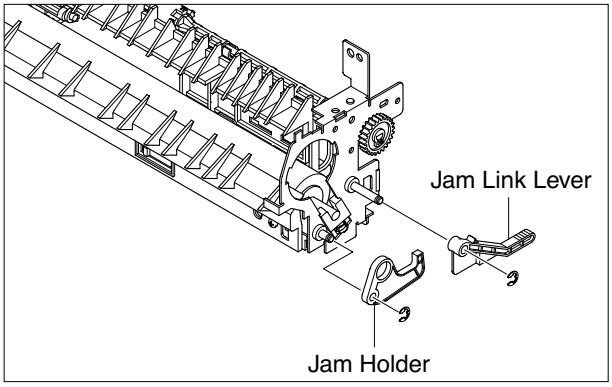


10. Release the Fuser Gear and HR Bush and then remove the Heat Roller, as shown below.



11. Remove the Jam Link Lever (L,R) and Jam Holder (L,R) and then remove the Pressure Roller, as shown below.

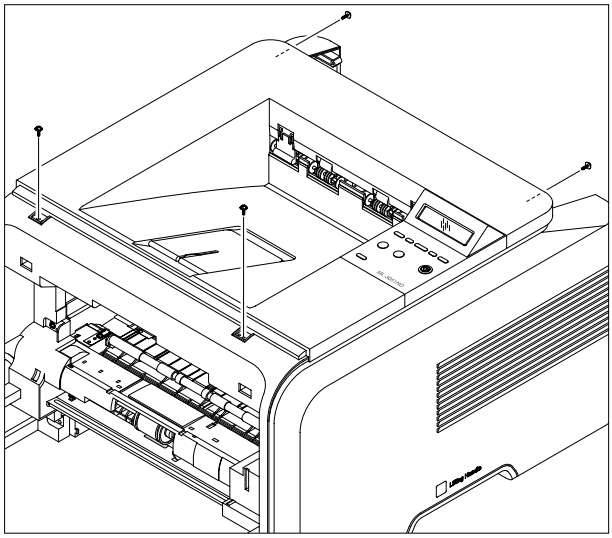




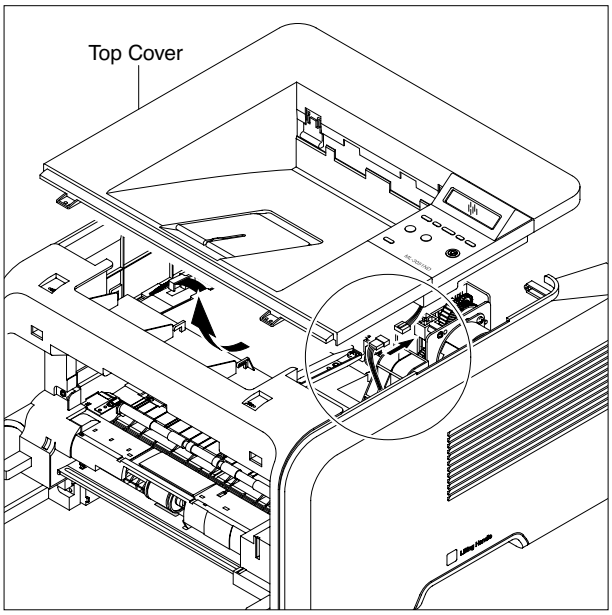
3.7 Top Cover

1. Before you remove the Top Cover, you should remove:
   - Rear Cover (Left, Right) (Refer to 3.5)

2. Remove the four screws securing the Top Cover, as shown below.

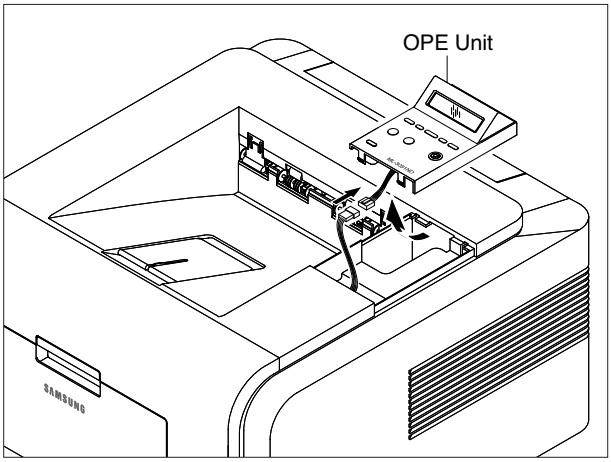


3. To remove the Top Cover, first lift the Top Cover with a light pressure to the direction of arrow. Then unplug the OPE Harness, as shown below.



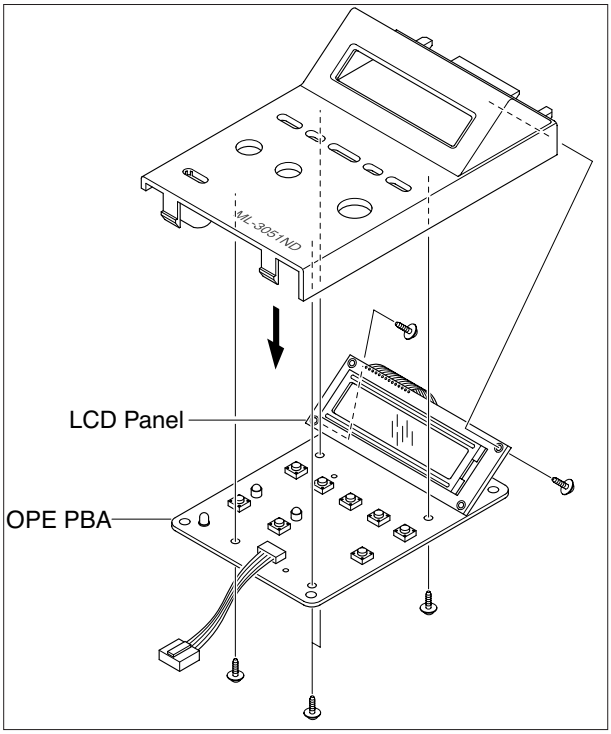
3.8 OPE Unit

1. To remove the OPE Unit, first lift the OPE Unit with a light pressure to the direction of arrow, Then unplug the OPE Harness, as shown below.

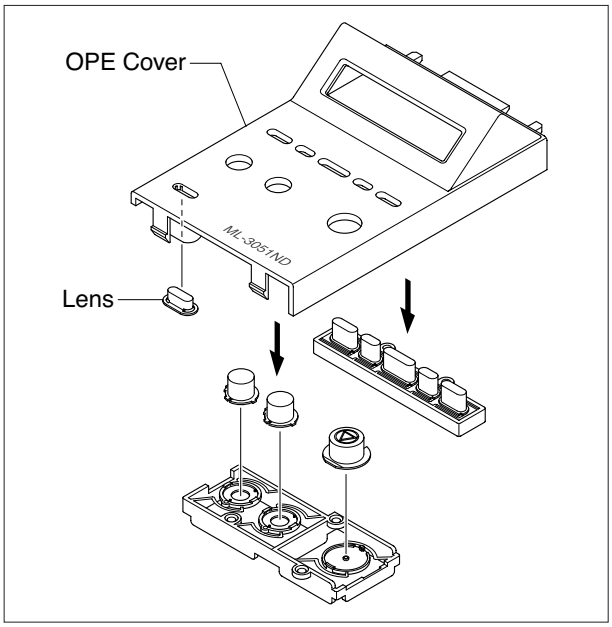


Notice : When reassembly the OPE Unit, hole inside of figure insert a harness.

2. Remove the six screws securing the OPE PBA and LCD Panel to the OPE Cover and remove it, as shown below.



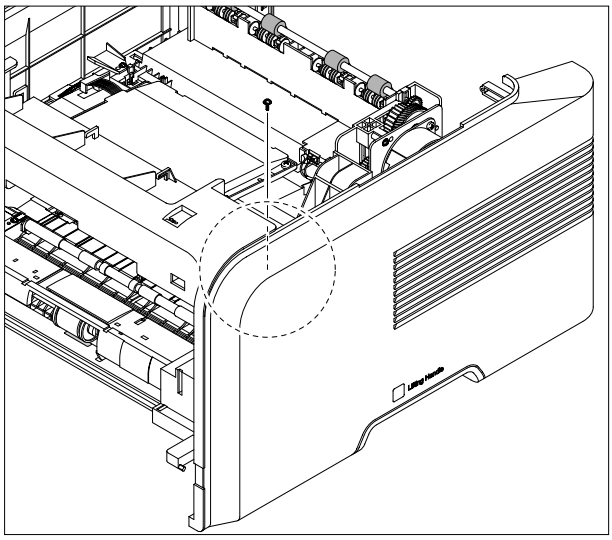
3. Release the Lens and Keys from the OPE Cover.



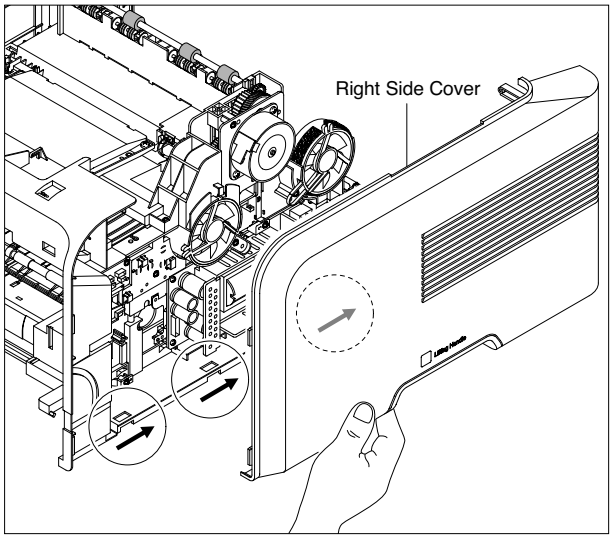
3.9 Side Cover (Left, Right)

1. Before you remove the Side Cover (Left, Right), you should remove:
   - Rear Cover (Refer to 3.5)
   - Top Cover (Refer to 3.7)

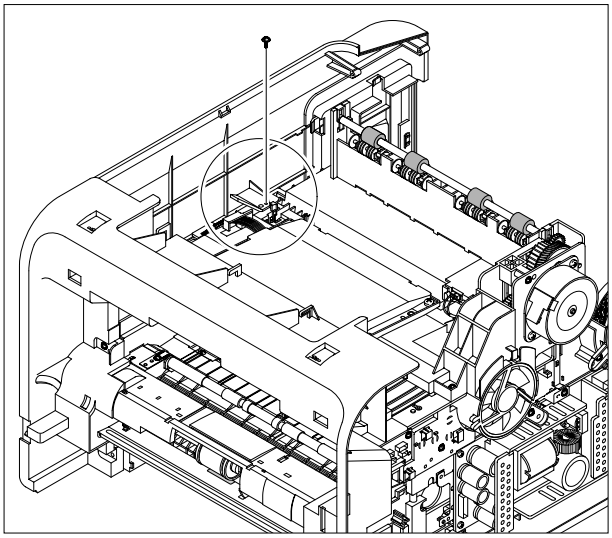
2. Remove the one screw securing the Right Side Cover, as shown below.



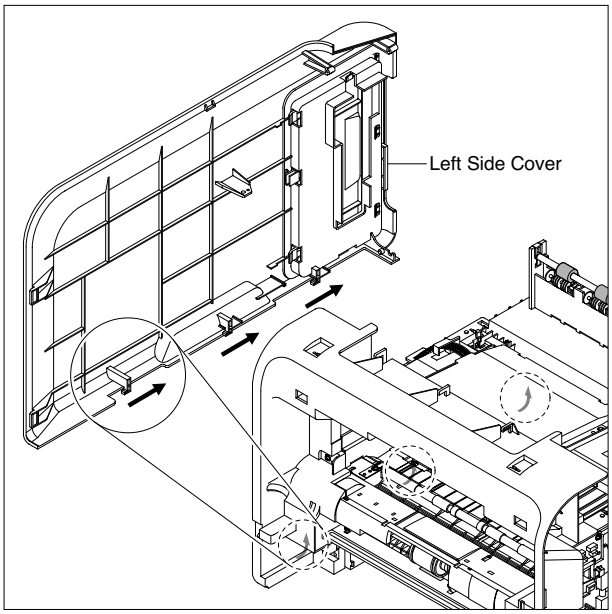
3. Apply light pressure to the bottom of the Right Side Cover and pull it to the right side in the direction of arrows, as shown below.



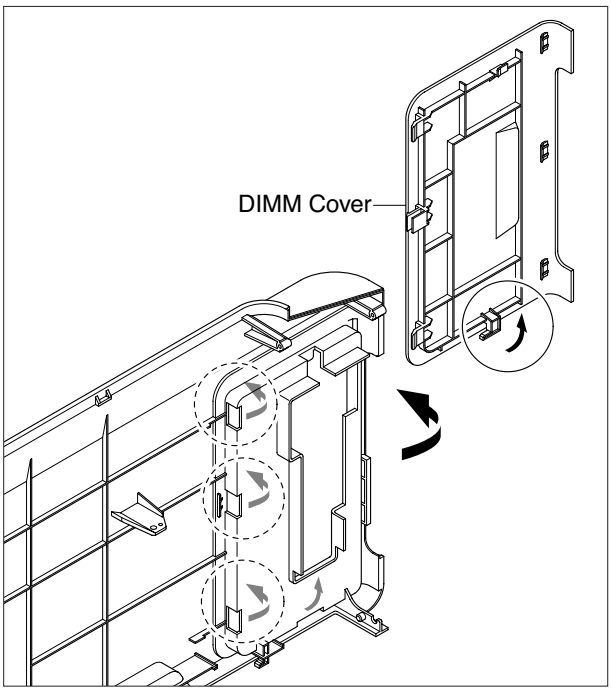
4. Remove the one screw securing the Left Side Cover, as shown below.



5. Apply light pressure to the bottom of the Left Side Cover and pull it to the left side in the direction of arrows, as shown below.



6. If necessary, pull the DIMM Cover in the direction of arrow and remove it, as shown below.

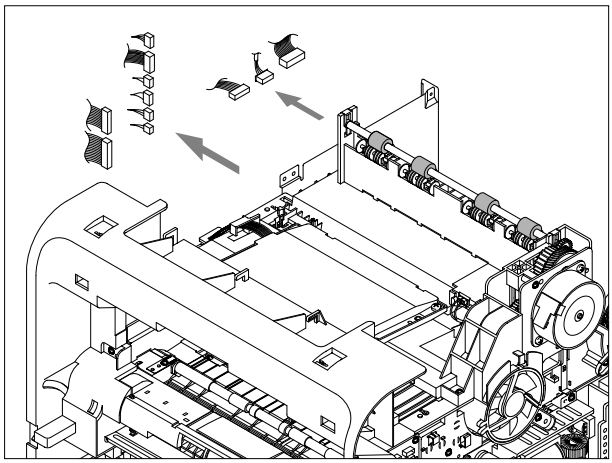


Notice : Be careful not to damage the hooks when remove the Side Cover (Left, Right).

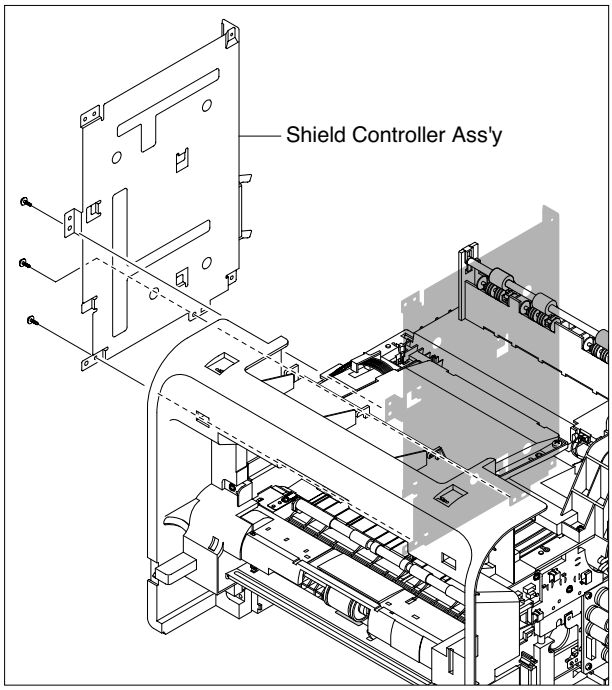
3.10 Shield Controller Ass'y

1. Before you remove the Shield Controller Ass'y, you should remove:
   - Side Cover Left (Refer to 3.9)

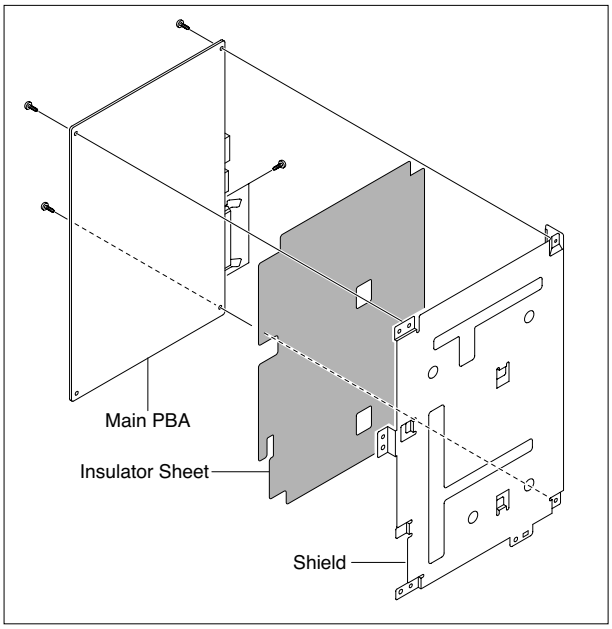
2. Unplug the all connectors from the Main PBA.



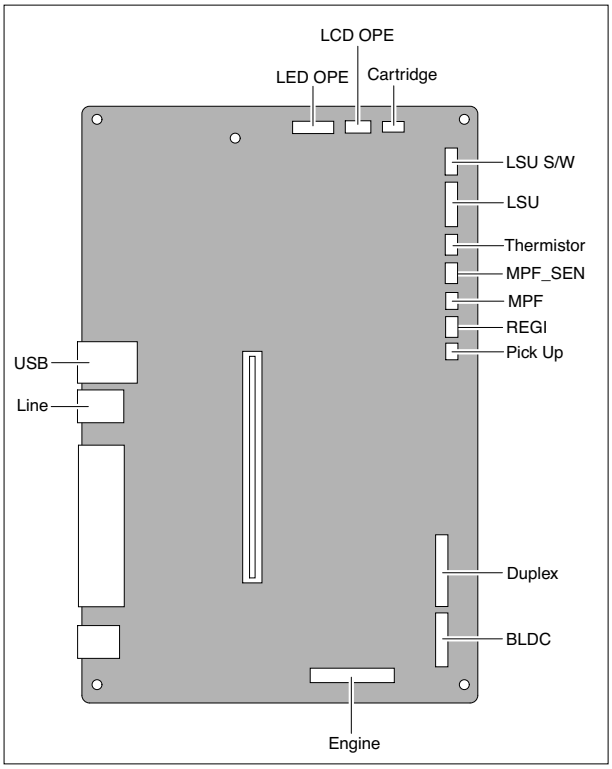
3. Remove the three screws securing the Shield Controller Ass'y and remove it.



4. Remove the five screws securing the Main PBA to the Shield and remove it.



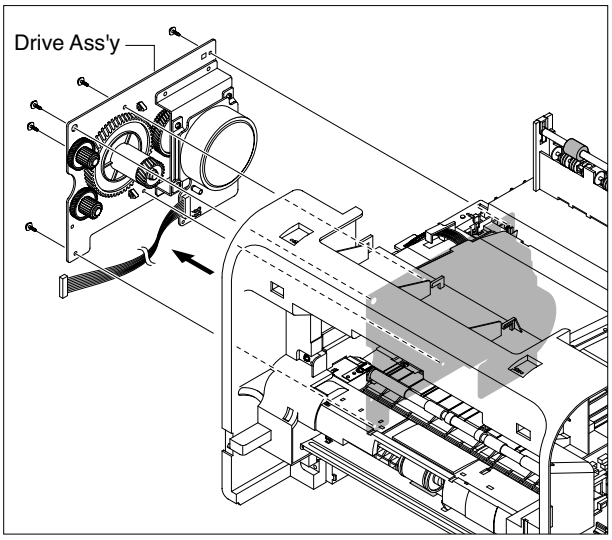
5. The connectors are located, as shown below.



3.11 Drive Ass'y

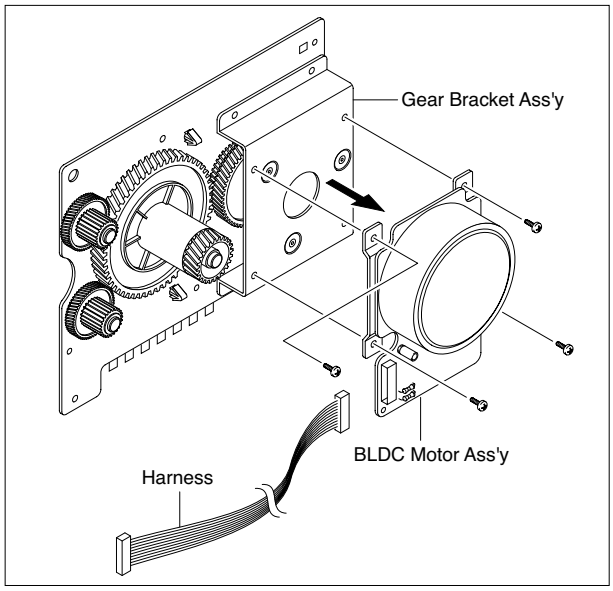
1. Before you remove the Drive Ass'y, you should remove:
   - Side Cover Left (Refer to 3.9)

2. Remove the six screws securing the Drive Ass'y and remove it.



Notice : The six screws have numbers stamped into the Drive Ass'y base plate. When refitting the Drive Ass'y tighten the screws the order they are numbered. Only screws numbered 1 to 5 are fitted at this stage. Screw 6 is fitted when the Shield Controller Ass'y is refitted.

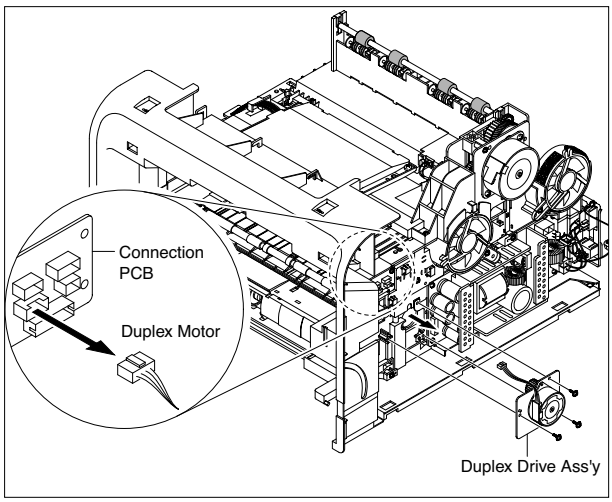
3. If necessary, remove the four screws securing the BLDC Motor Ass'y and remove it.



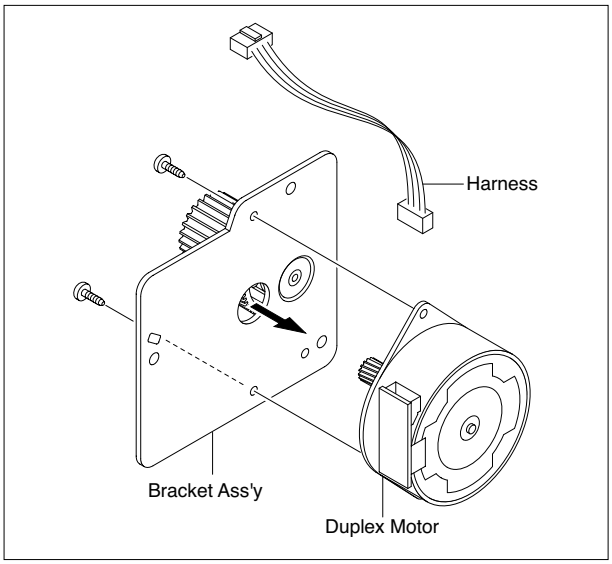
3.12 Duplex Drive Ass'y

1. Before you remove the Duplex Drive Ass'y, you should remove:
   - Side Cover Right (Refer to 3.9)

2. Unplug the connector from the Connection PCB and remove the three screws securing the Duplex Drive Unit and remove it.



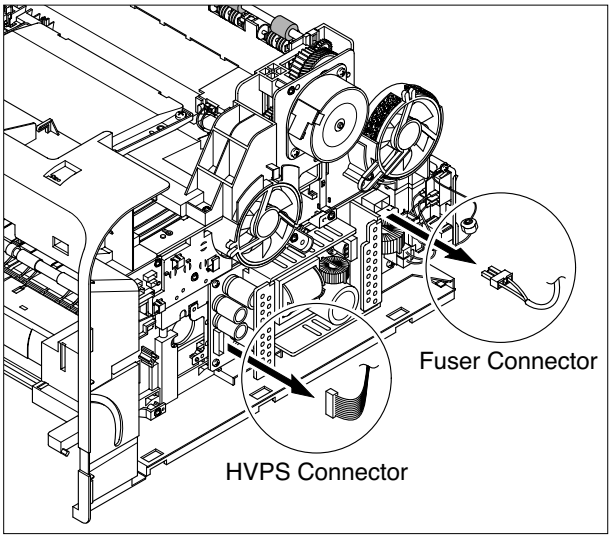
3. If necessary, remove the two screws securing the Duplex Motor and remove it.



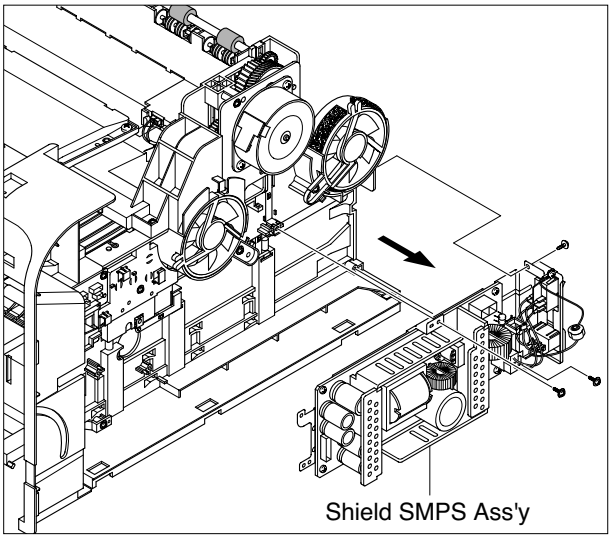
3.13 Shield SMPS Ass'y

1. Before you remove the Shield SMPS Ass'y, you should remove:
   - Side Cover Right (Refer to 3.9)
   - Duplex Drive Ass'y (Refer to 3.12)

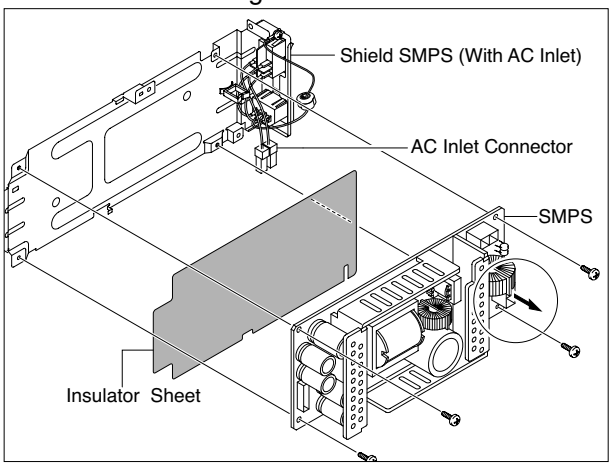
2. Unplug the two connectors (HVPS, Fuser).



3. Remove the three screws securing the Shield SMPS Ass'y and remove it.



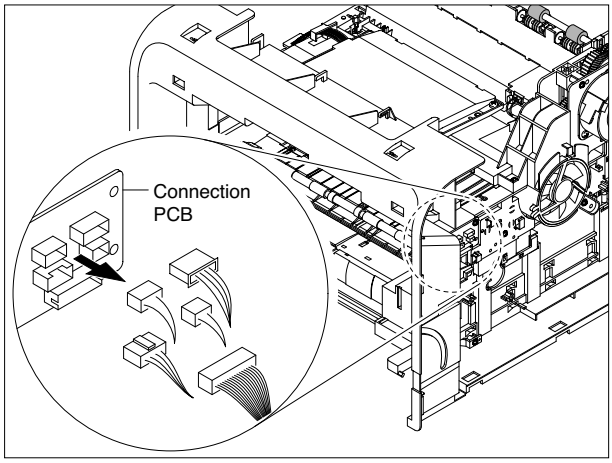
4. Unplug the connector (AC Inlet) and remove the four screws securing SMPS and remove it.



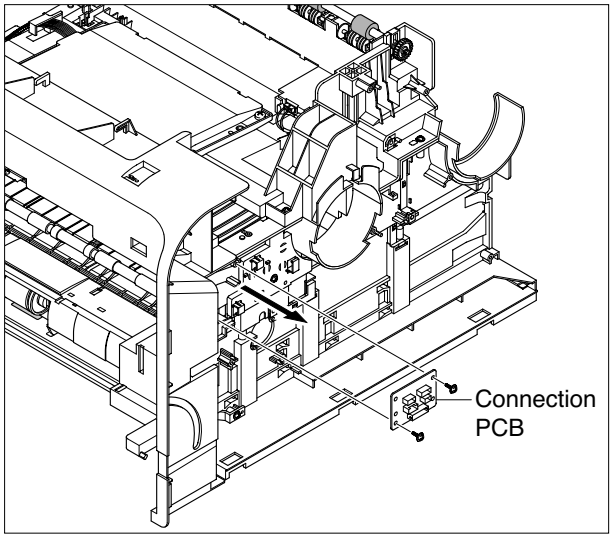
3.14 Connection PCB

1. Before you remove the Connection PCB, you should remove:
   - Side Cover Right (Refer to 3.9)

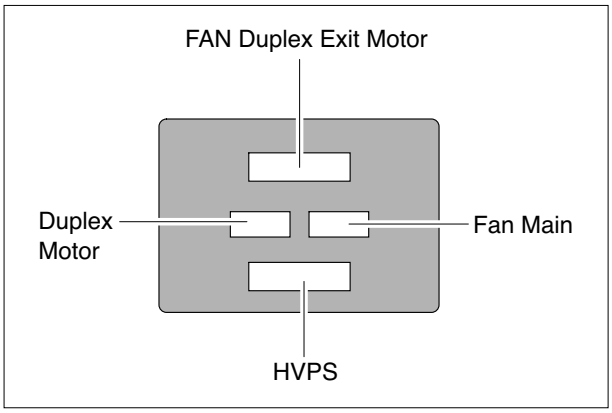
2. Unplug the all connectors.



3. Remove the two screws securing the Connection PCB and remove it.



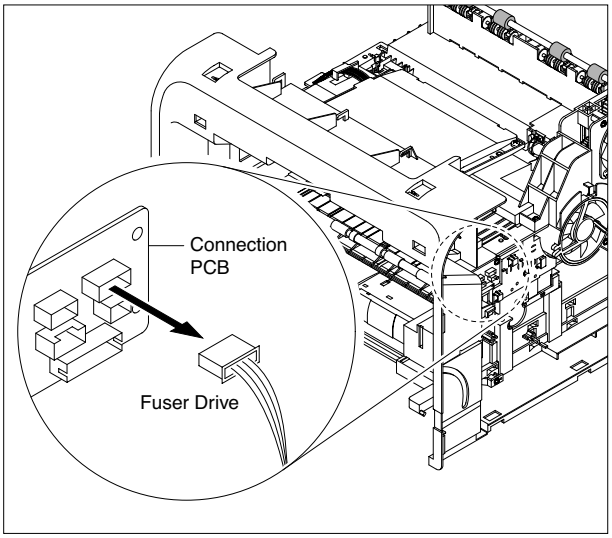
4. The connectors are located, as shown below.



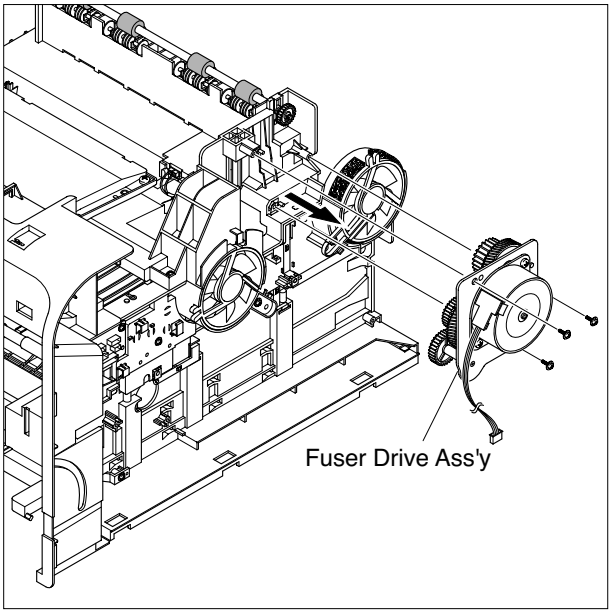
3.15 Fuser Drive Ass'y

1. Before you remove the Fuser Drive Ass'y, you should remove:
   - Side Cover Right (Refer to 3.9)

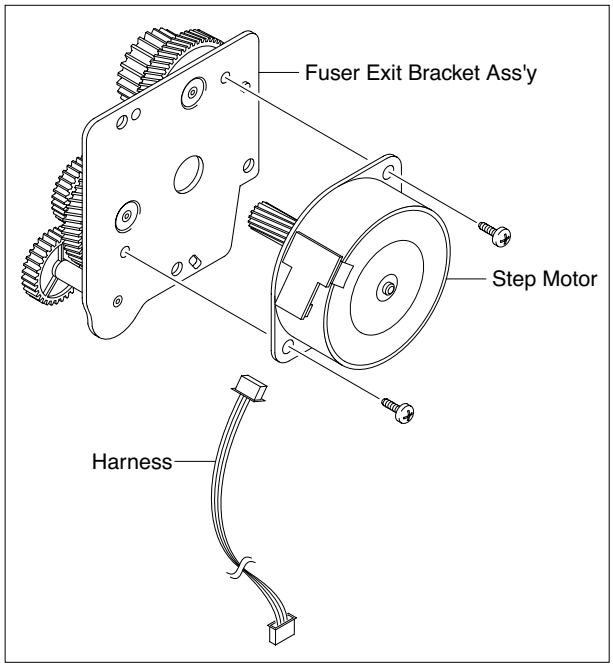
2. Unplug the connector from the Connection PCB.



3. Remove the three screws securing the Fuser Drive Ass'y and remove it.



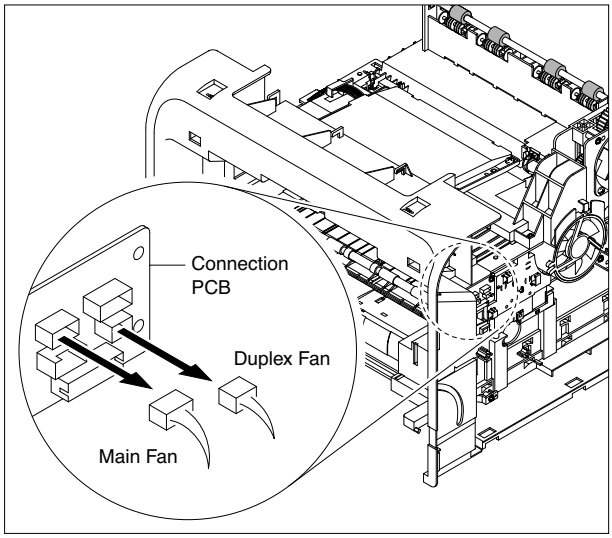
4. If necnsary, remove the two screws securing the Step Motor and remove it.



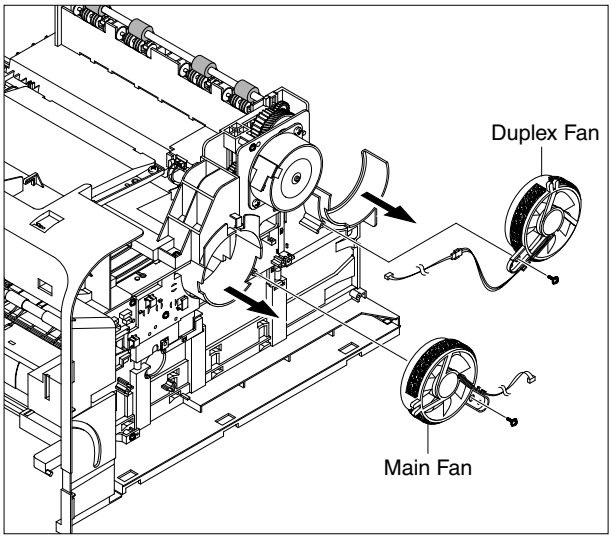
3.16 Fan

1. Before you remove the Fan, you should remove:
   - Side Cover Right (Refer to 3.9)

2. Unplug the two connectors from the Connection PCB, as shown below.



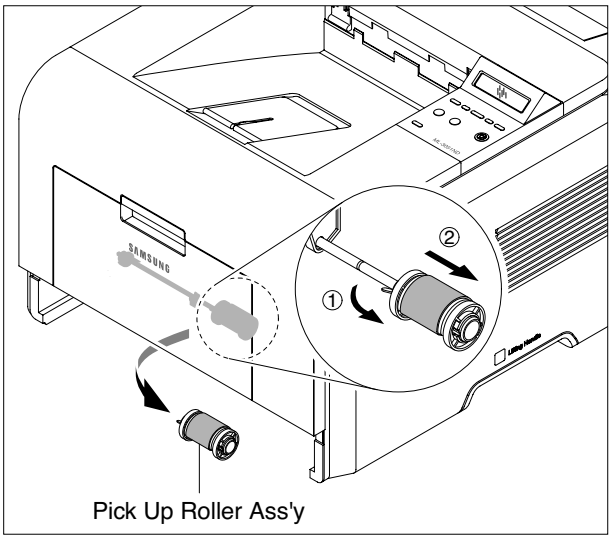
3. Remove the two screws securing the Fans and then pull the Fans (Main, Duplex).



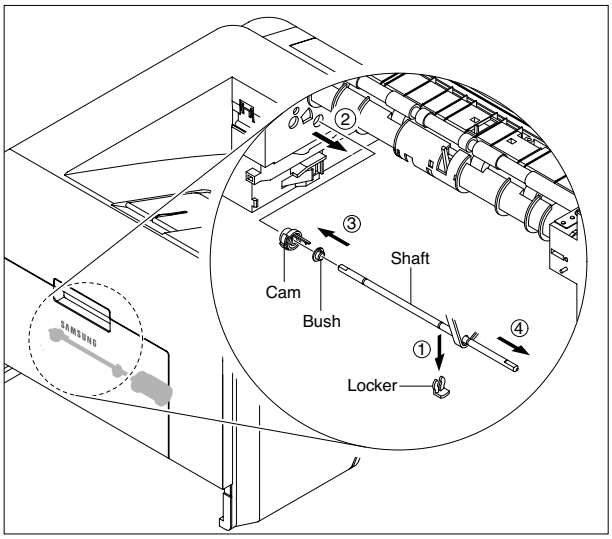
3.17 Pick Up Roller Ass'y

1. Take out the Cassette.

2. To remove the Pick Up Roller Ass'y, first lift the notch attached to the Pick Up Roller Ass'y from the Shaft, then slide the Pick Up Roller Ass'y from left to right and it will be released completely, as shown below.



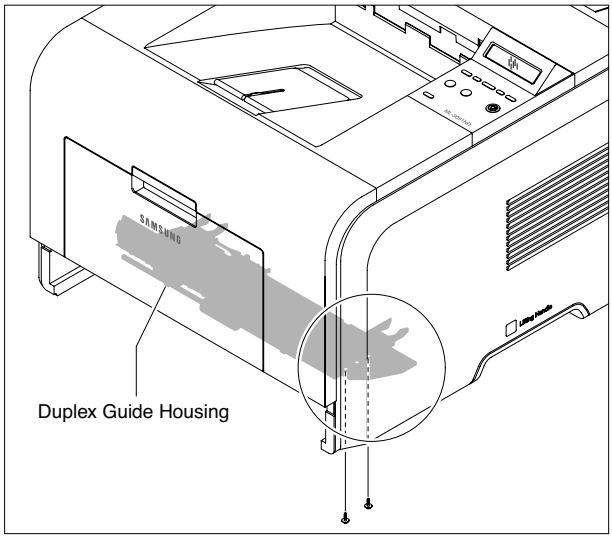
3. To remove the Shaft, first release the locker and slide the Shaft from left to right, then lift the notch attached to the Cam so that it's released from the Shaft. Then release the Bush from the Shaft and remove the Shaft from the Duplex Guide Housing, as shown below.



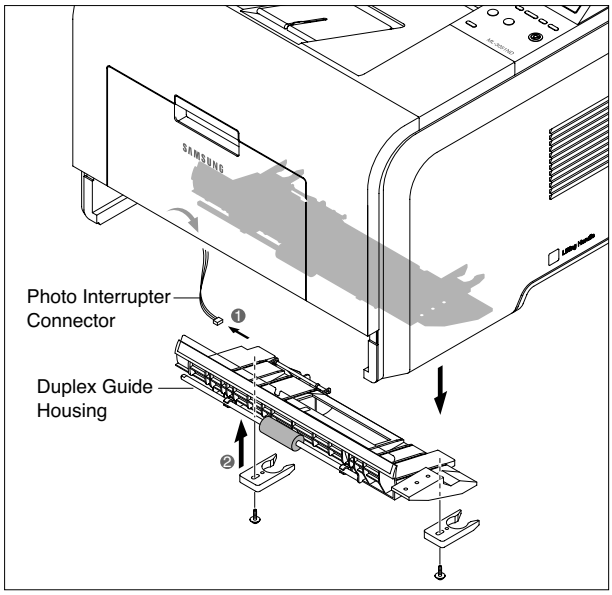
3.18 Duplex Guide Housing (With Feed Roller)

1. Before you remove the Duplex Guide Housing, you should remove:
   - Pick Up Roller Ass'y (Refer to 3.17)

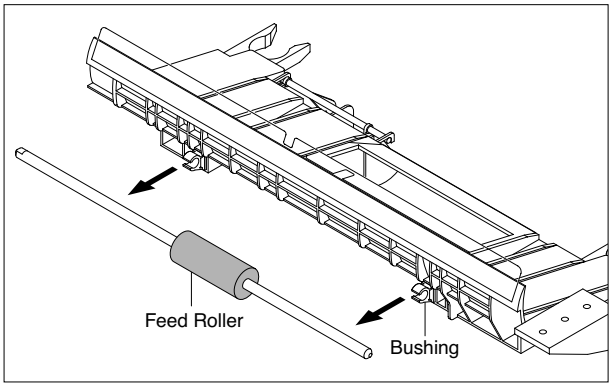
2. Remove the two screws securing the Duplex Guide Housing.



3. Unplug the one connector (Photo Interrupter) and remove the Duplex Guide Housing (with Feed Roller), as shown below.



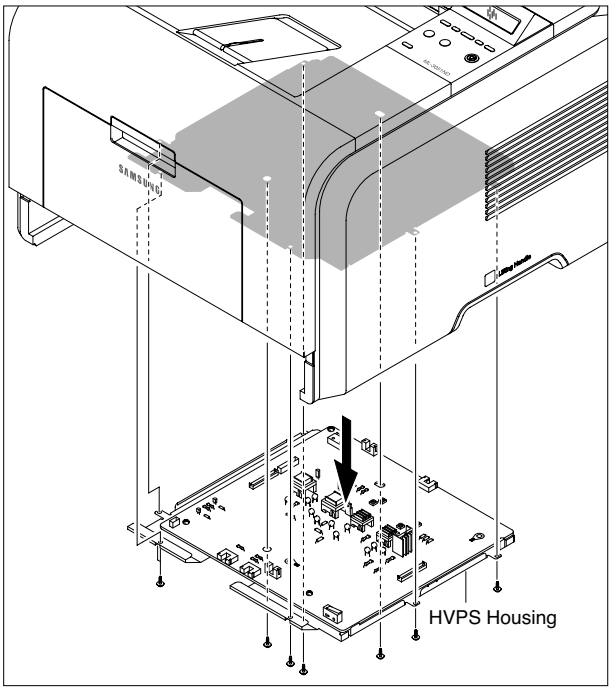
4. Pull the Feed Roller from the Bushing.



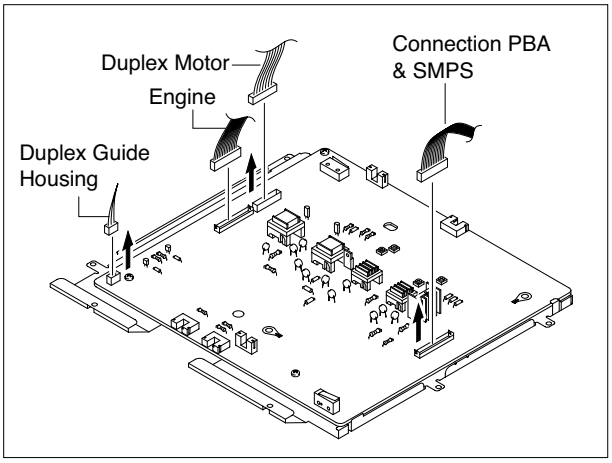
3.19 HVPS Housing

1. Before you remove the HVPS Housing, you should remove:
   - Duplex Drive Ass'y (Refer to 3.12)
   - Unplug the HVPS Connector (Refer to 3.13)
   - Pick Up Roller Ass'y (Refer to 3.17)
   - Duplex Guide Housing (Refer to 3.18)

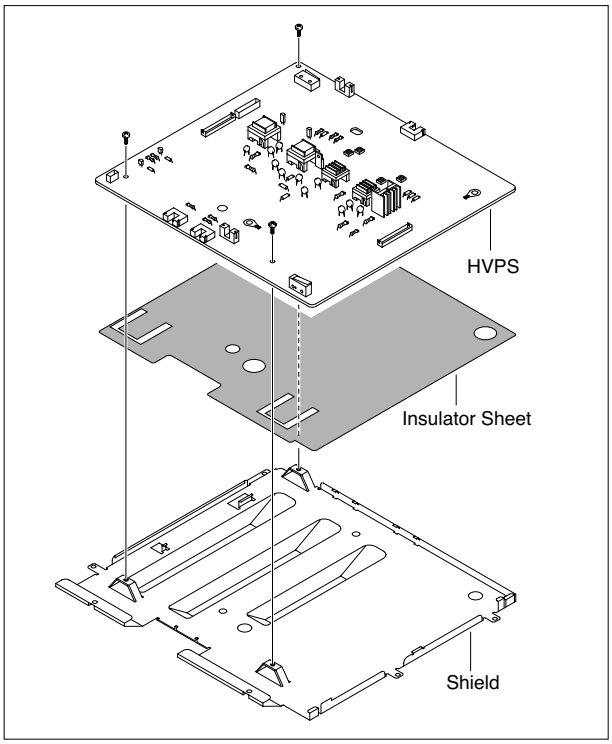
2. Remove the eight screws securing the HVPS Housing, as shown below.



3. Unplug the connector for connector PBA and SMPS first. Unplug the other Connections.



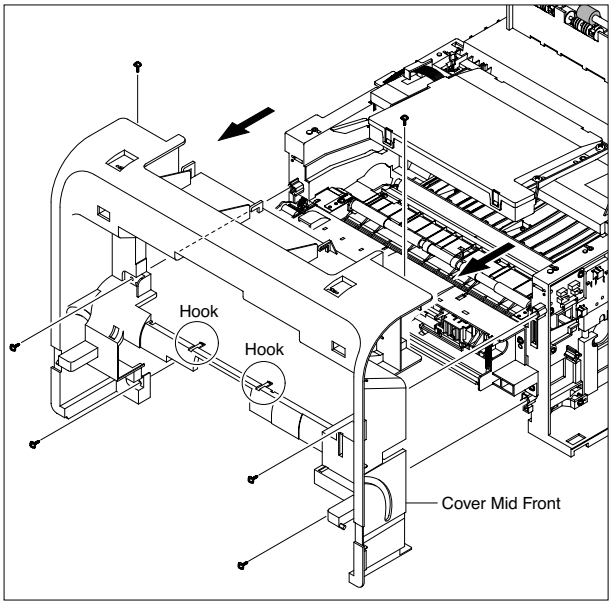
4. If necessary, remove the three screws securing the HVPS and remove it.



3.20 Cover Mid Front

1. Before you remove the Cover Mid Front, you should remove:
   - Top Cover (Refer to 3.7)
   - Side Cover (Refer to 3.9)

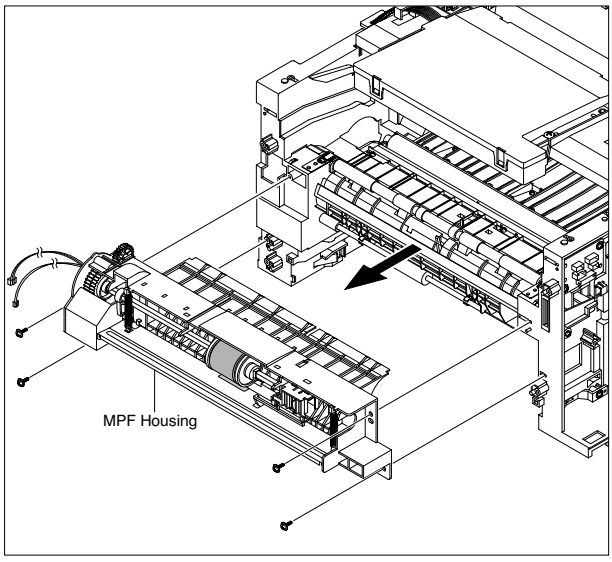
2. Remove the six screws securing the Cover Mid Front and release two hooks in the center.
   This cover is fragile take care when removing it.



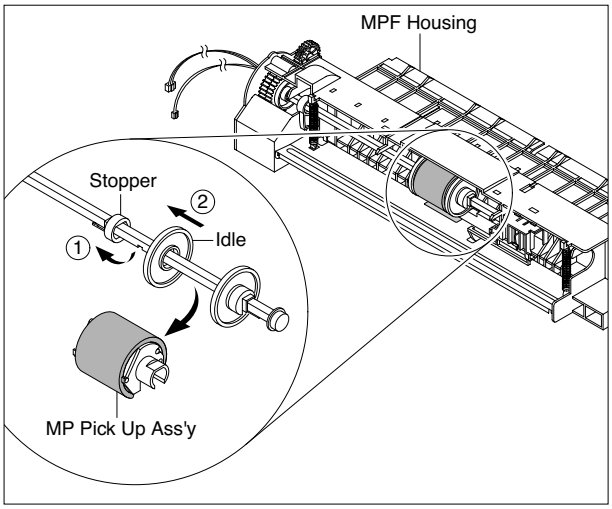
3.21 MPF Housing

1. Before you remove the MPF Housing, you should remove:
   - Cover Mid Front (Refer to 3.20)

2. Remove the four screws securing the MPF Housing and remove it.



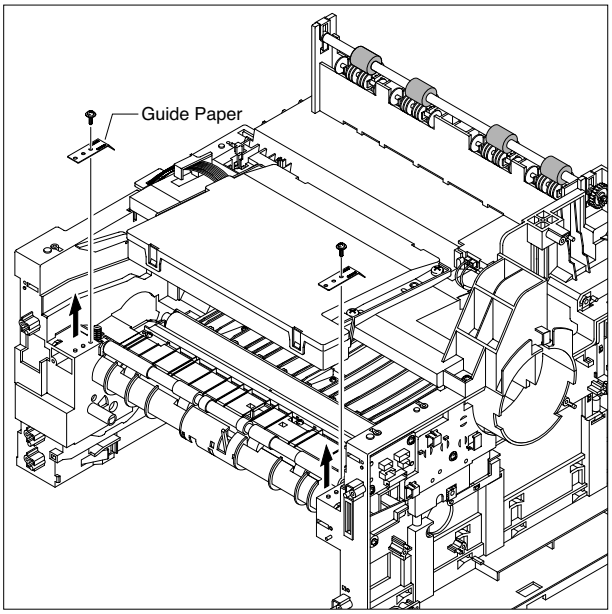
3. To remove the MP Pick Up Ass'y, first lift the notch attached to the left side Stopper so that it's slide the right to left from the Shaft, then left side Idle slid the right to left from the Shaft and take out the MP Pick Up Ass'y, as shown below.



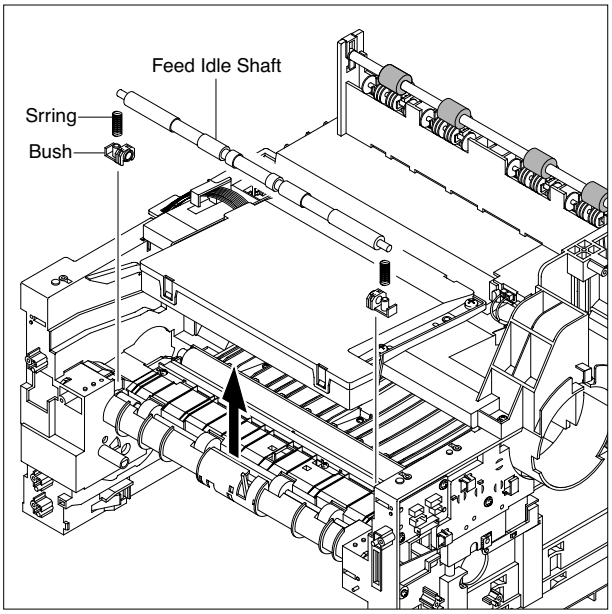
3.22 Feed Roller Parts

1. Before you remove the Feed Roller Parts, you should remove:
   - Pick Up Roller Ass'y (Refer to 3.17)
   - Duplex Guide Housing (Refer to 3.18)
   - Cover Mid Front (Refer to 3.20)
   - MPF Housing (Refer to 3.21)

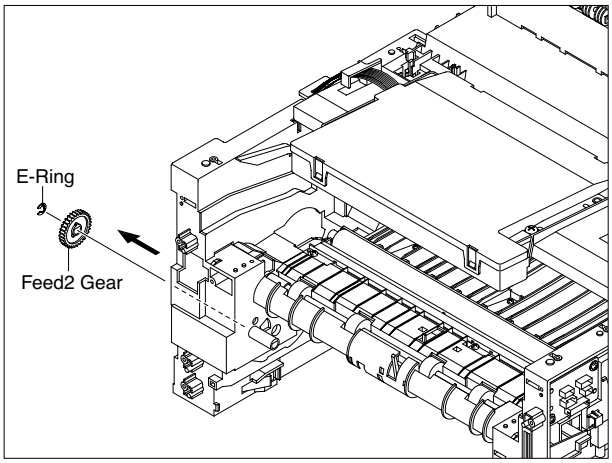
2. Remove the two screws securing the both side of the Guide Paper and then remove the Guides.



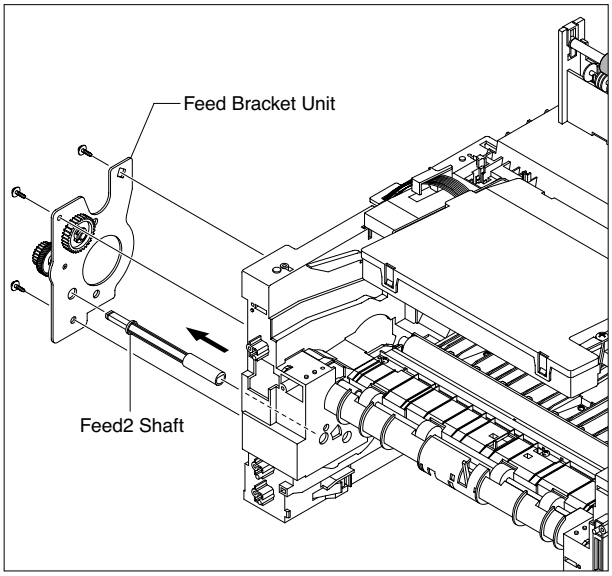
3. Pull up the Feed Idle Shaft and the Bushs (with Spring).



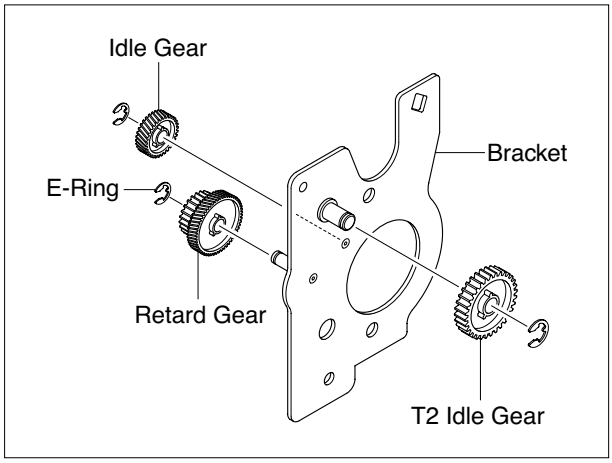
4. Release the E-Ring securing the Feed2 Gear and remove it.



5. Remove the three screws securing the Feed Bracket Unit and then remove the Feed Bracket Unit and Feed2 Shaft.

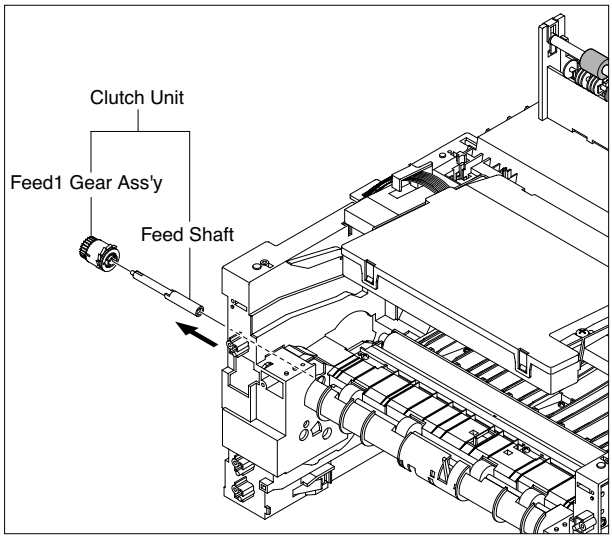


6. If necessary, release the three E-Rings securing the Gears (T2 Idle, Retard, Idle) and then remove the Gears from the Feed Bracket, as shown below.

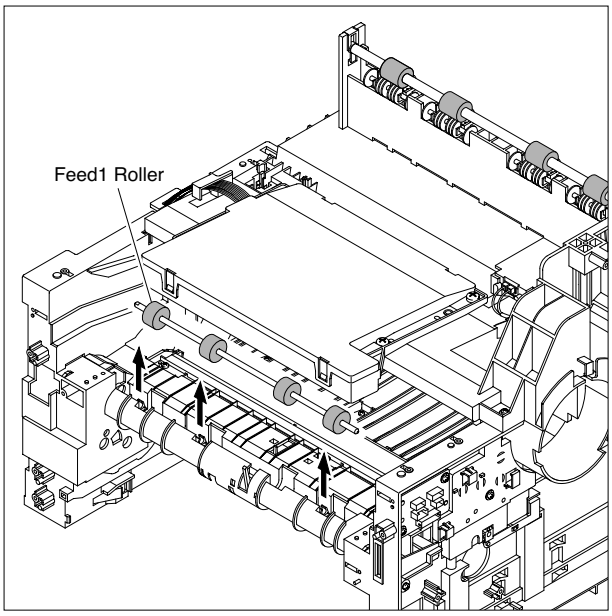


Notice : Be aware of the E-Rings to ensure they are not lost.

7. Remove the Clutch Unit, as shown below.



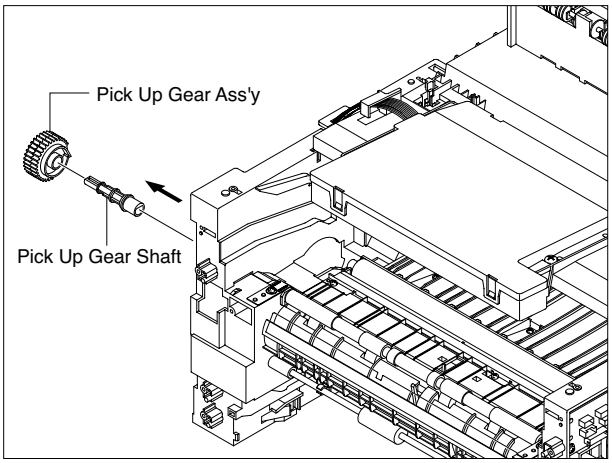
8. Pull up the Feed1 Roller from the Bushing, as shown below.



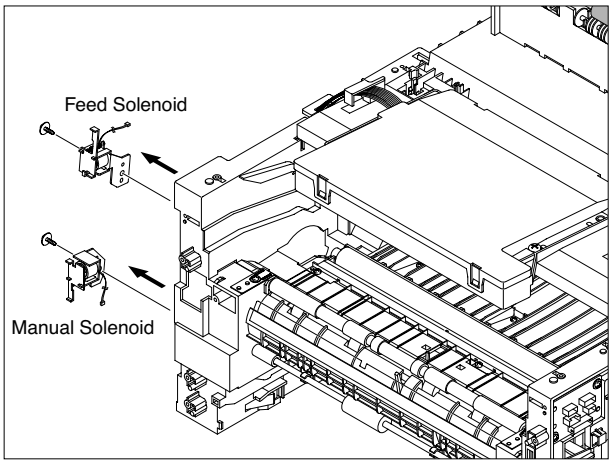
3.23 Pick Up Gear Ass'y & Solenoids

1. Before you remove the Pick Up Gear Ass'y & Solenoids, you should remove:
   - Duplex Guide Housing (Refer to 3.18)
   - Feed Bracket Unit (Refer to 3.22.5)

2. Release the Pick Up Gear Ass'y and Pick Up Gear Shaft, as shown below.



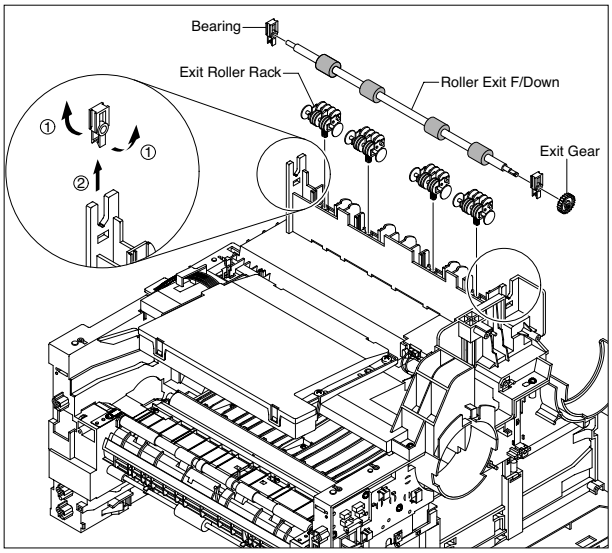
3. Remove the two screws securing the Manual Solenoid and Feed Solenoid and then remove the Solenoids, as shown below.



3.24 Exit Roller

1. Before you remove the Exit Roller, you should remove:
   - Top Cover (Refer to 3.7)
   - Side Cover (Refer to 3.9)
   - Fuser Drive Ass'y (Refer to 3.15)

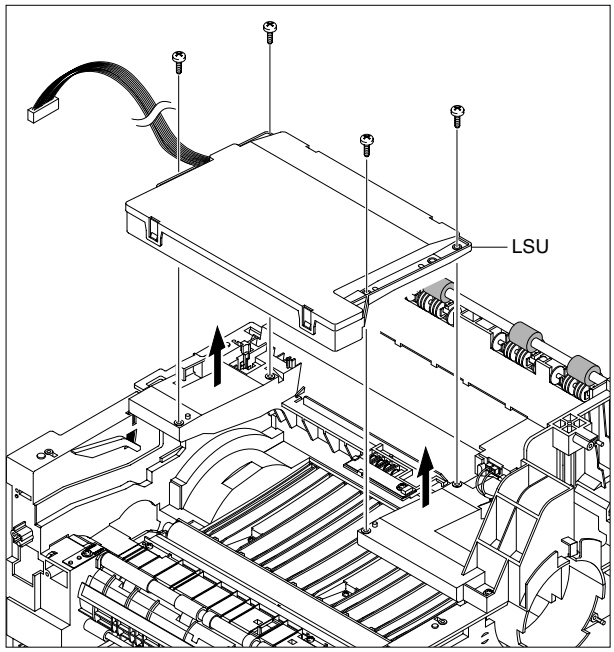
2. Remove the Exit Gear, and release the Bearing at one end then remove the Roller Exit F/Down and Exit Roller Rack, as shown below.



3.25 LSU

1. Before you remove the LSU, you should remove:
   - Top Cover (Refer to 3.7)
   - Side Cover (Refer to 3.9)

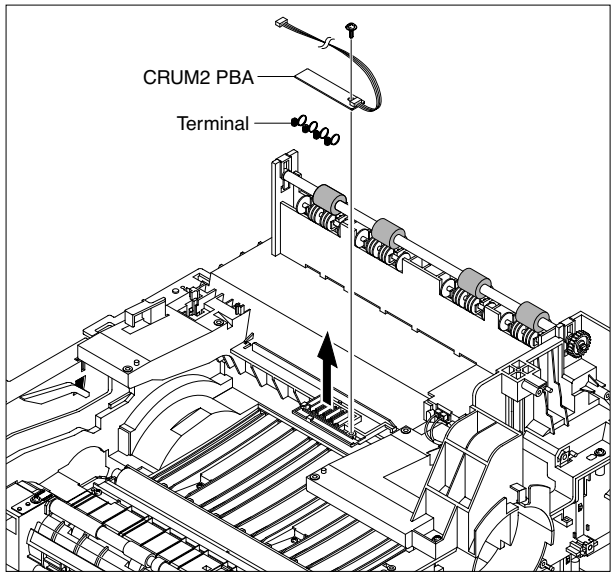
2. Remove the four screws securing the LSU and remove it.



3.26 TERMINAL

1. Before you remove the CRUM2 PBA, you should remove:
   - Top Cover (Refer to 3.7)
   - Side Cover (Refer to 3.9)
   - LSU (Refer to 3.25)

2. Remove the one screw securing the CRUM2 PBA and remove it and then release the four Terminals, as shown below.

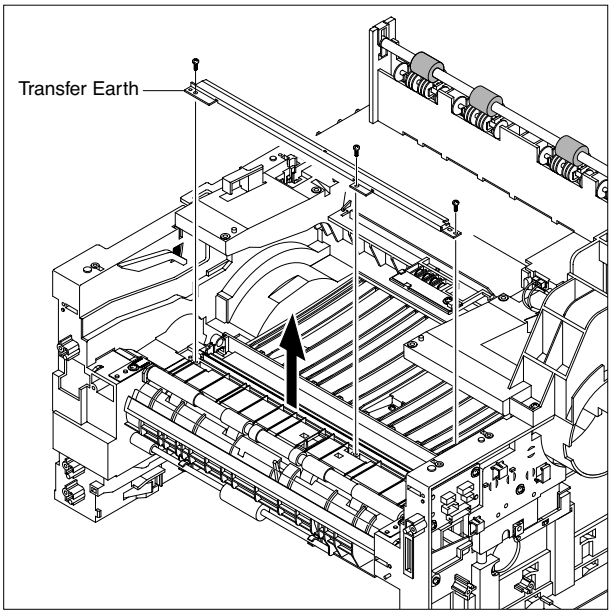


Notice : Be aware of the Terminals to ensure they are not lost.

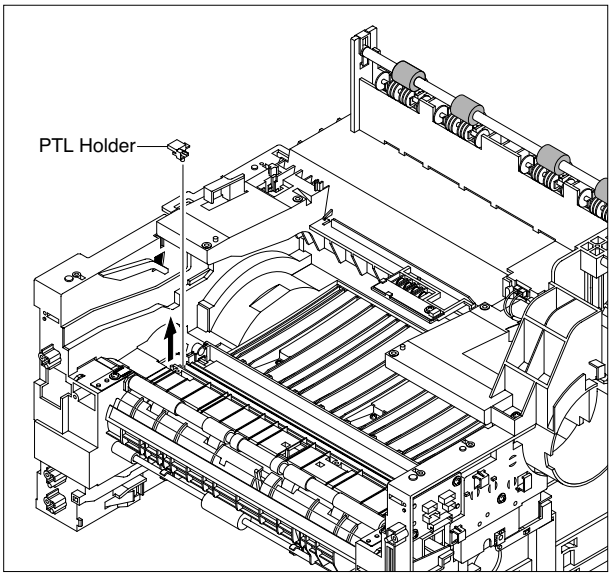
3.27 Transfer Roller Parts

1. Before you remove the Transfer Roller Parts, you should remove:
   - Cover Mid Front (Refer to 3.20)
   - LSU (Refer to 3.25)

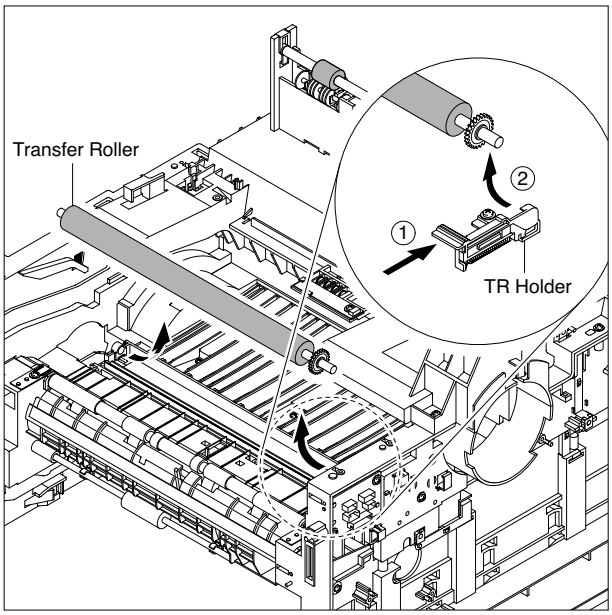
2. Remove the three screws securing the Transfer Earth and remove it.



3. Release the PTL Holder, as shown below.



4. To remove the Transfer Roller, first pull the TR Holder and then take out the Transfer Roller, as shown below.



Notice : Do not grab the rubber part of the Transfer Roller, it may cause a malfunction due to a foreigen object. Hole the both side of the Transfer Roller when replacing it.

4. Adjustment and Troubleshooting

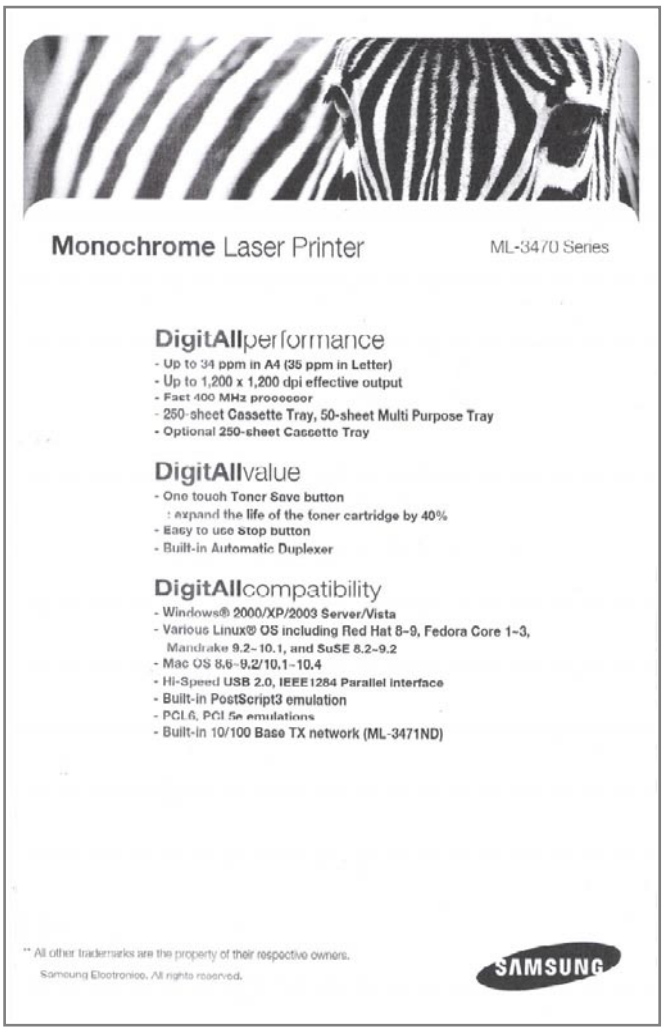
4.1 Alignment and Adjustments

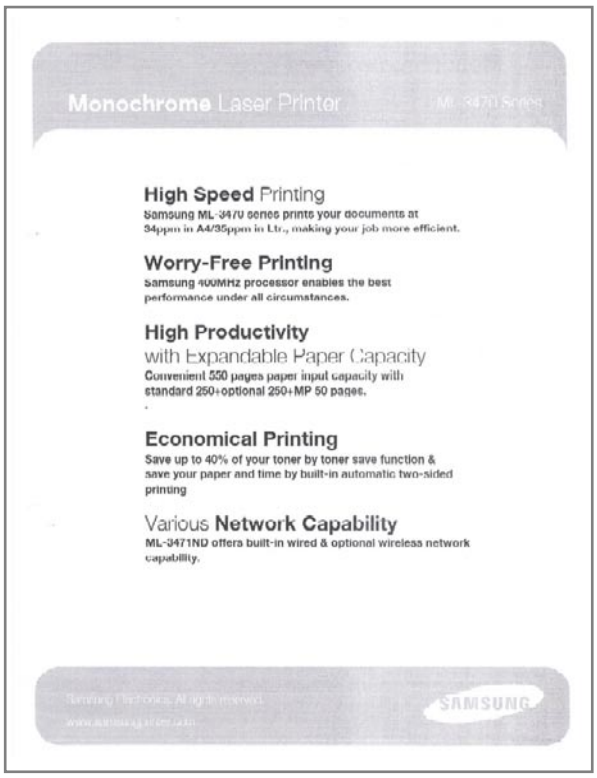
4.1.1 Sample Pattern

This product has the several sample patterns for maintenance. With the sample patterns, check the existence of the abnormality. The patterns help to regularly maintain the product.

4.1.1.1 Printing a Demo Page

Print a demo page or a configuration sheet to make sure that the printer is operating correctly.
Press the Menu button to selection (In formation -> Demo Page)

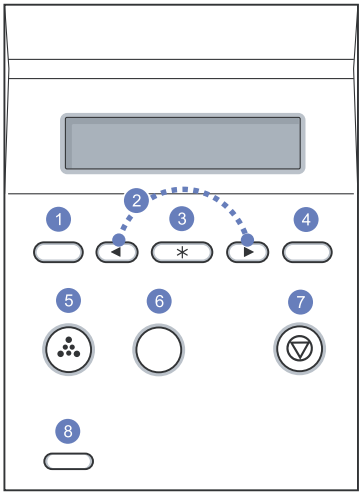




4.1.2 Control Panel

4.1.2.1 Control Panel

ML-3470D and ML-3471ND



1	**Menu**: Enters Menu mode and scrolls through the available menus.
2	**Scroll** buttons: Scroll through the options available in the selected menu, and increase or decrease values.
3	**OK**: Confirms the selection on the display.
4	**Back**: Sends you back to the upper menu level.
5	**Toner Save**: Allows you to save on toner by using less toner in printing.
6	**ML-347x _Duplex**: Allows you to print documents on both sides of the paper.
7	**Stop**: Stops an operation at any time.
8	**Status**: Shows the status of your printer.

4.1.2.2 System setup

This chapter provides step by step information on setting up your printer.
This chapter includes:
• Using control panel menus
• Menu overview
• Printing a demo page
• Changing the display language
• Using toner save mode

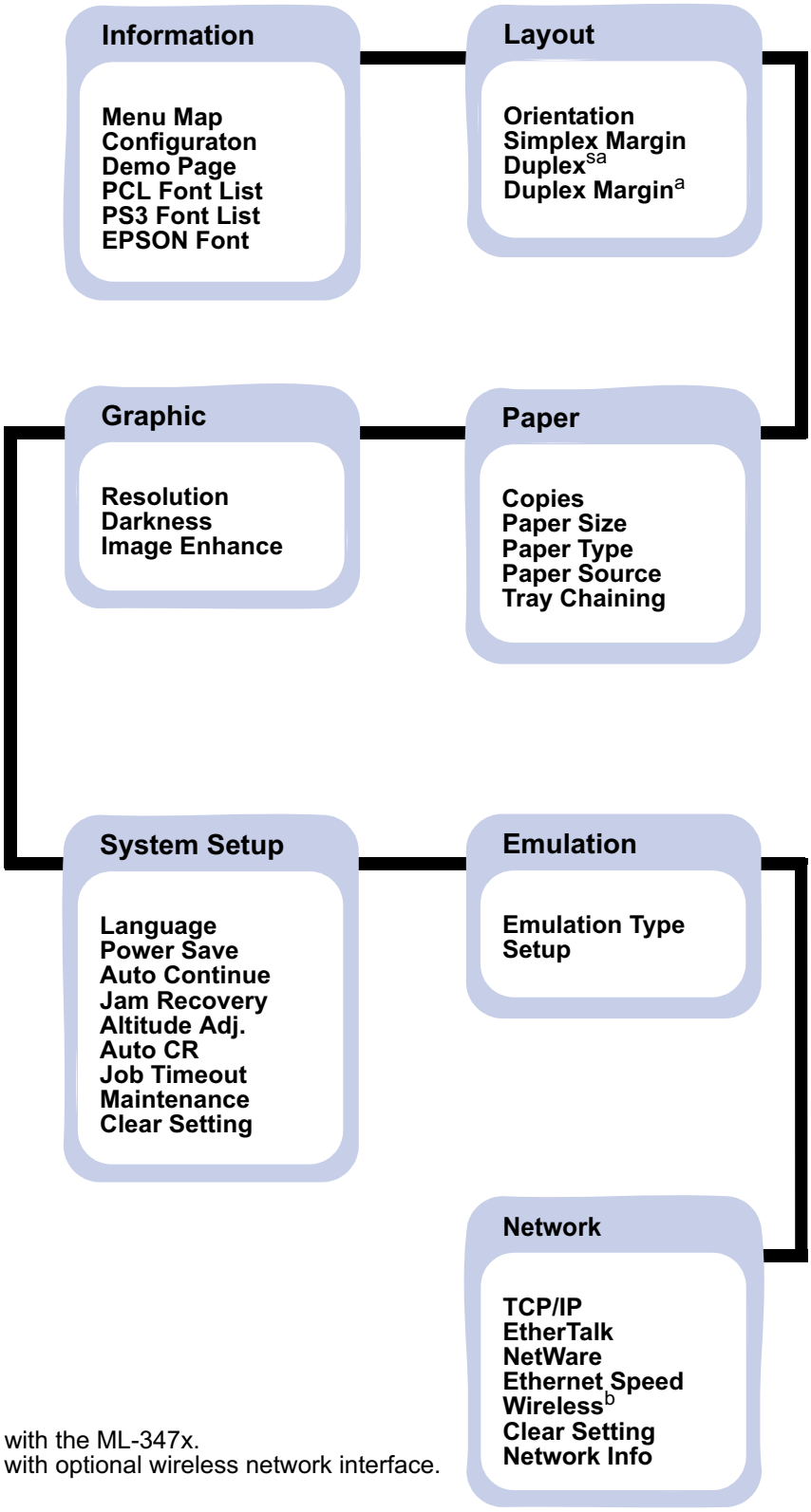
Using control panel menus

A number of menus are available to make it easy for you to change the printer settings. The diagram on the next column shows the menus and all of the menu items available in each menu.

Accessing control panel menus
You can control your printer from the printer's control panel. You can also set the control panel menus while the printer is in use.
1. Press Menu until the menu you want appears on the bottom line of the display and press OK.
2. Press the Scroll buttons until the desired menu item appears and press OK.
3. If the menu item has sub menus, repeat step 2.
4. Press the Scroll buttons to access the desired setting option or the required value.
5. Press OK to save your selection.
   An asterisk (*) appears next to the selection on the display, indicating that it is now the default.
6. Press Stop to return to Standby mode.
   After 60 seconds of inactivity (no key being pressed), the printer automatically returns to Standby mode.

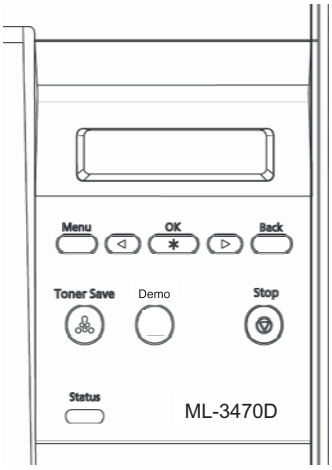
4.1.2.3 Menu overview

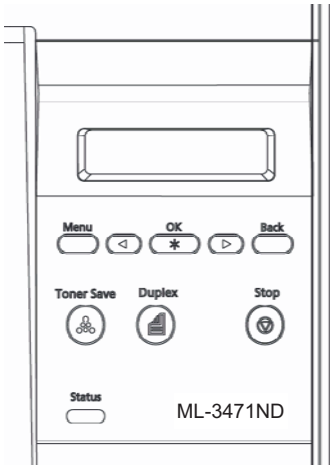
The control panel menus are used to configure the printer. The control panel provides access to the following menus:



a. Available with the ML-347x.
b. Available with optional wireless network interface.

4.1.2.4 Basic Operation of Panel

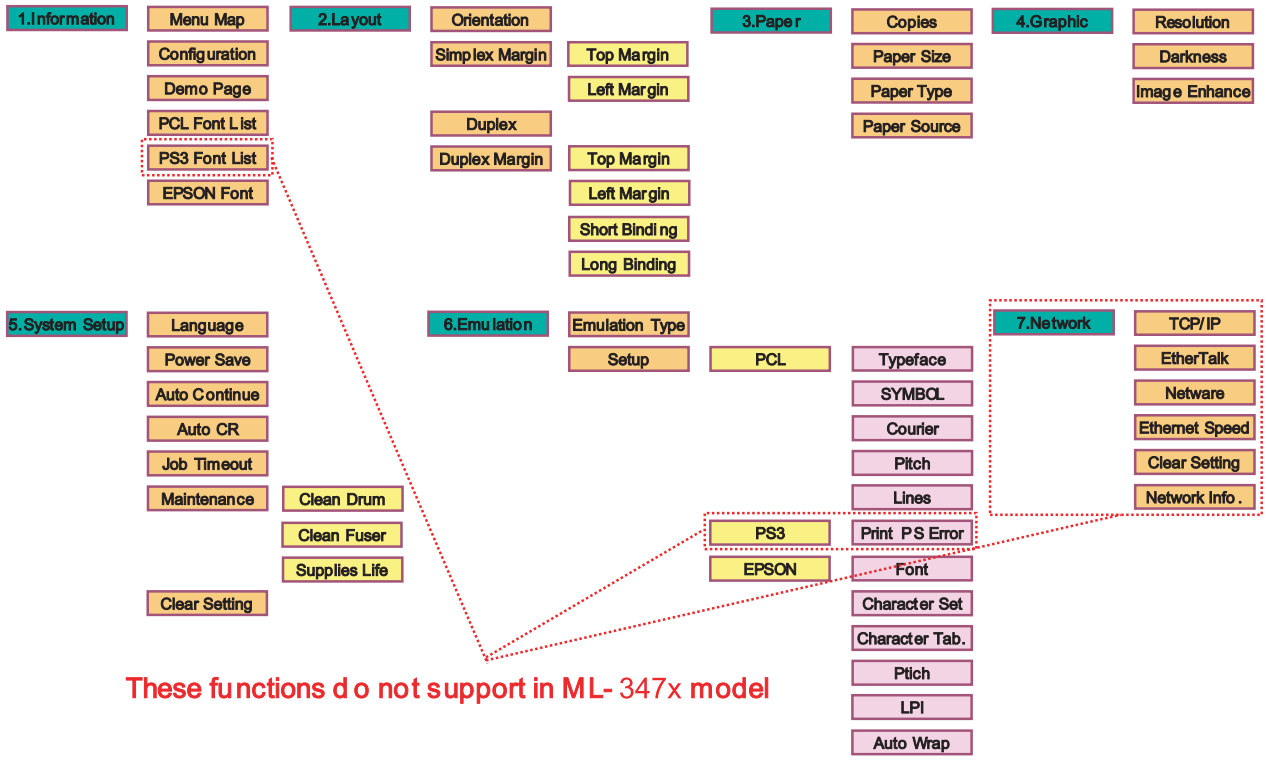




Status" LED		Description
Off		· Power Off / Sleep Mode (When data receive it'll Wake-up)
Green	On	· Ready status
	Blink	· Blink Slowly : Data Comm. status Blink Fast : Printing status
Red	On	Error which needs user action (Toner Empty, Paper Jam, Paper Empty, Cover Open etc..)
	Blink	· Recoverable Error (Paper Mismatching, Manual printing in MP Tray) · Warning status Warning just like supplies exchange (Toner Low etc.)

Error Type	Legacy models Error	Platform model Error
Recoverable Error	Error which can be recoverable Ex) Jam, Paper Empty, etc.	Error which doesn't need any special user actions Ex) Paper Mismatching, Manual printing in MP Tray
Error	Just like hardware error which can not be fixed even if user does special action Ex) Hsync Error, LSU Error, etc.	Including provider service error which need some special user or provider actions Ex) Toner Empty, Paper Jam, Paper Empty, Cover Open, etc.
Assert behavior	LCD model - It shows the task name and the lines in LCD display	LCD model - It shows the task name and the lines in LCD display

Operation Map



4.1.3 Consumables and Replacement Parts

To avoid print quality and paper feed problems resulting from worn parts and to maintain your printer in top working condition the following items will need to be replaced at the specified number of pages or when the life span of each item has expired.

COMPONENT	REPLACEMENT CYCLE
Pick-up Roller	150K Pages
Transfer Roller	70K Pages
Fuser	80K Pages
Toner Cartridge	10K Pages(Sales), 4K Pages(Initial)

4.1.4 LED Status Error Message

4.1.4.1 Status LED

Status		Description
Off		• The printer is off-line and cannot print. • The printer is in power save mode. When data is received, it switches to on-line automatically.
Green	On	The printer is on-line and can receive data from the computer.
	Blinking	• When the backlight blinks slowly, the printer is receiving data from the computer. • When the backlight blinks quickly, the printer is receiving and printing data.
Red	On	• The toner cartridge is totally exhausted. Remove the old toner cartridge and install a new one. • A paper jam has occurred. To solve the problem. • The front cover is open. Close the front cover. • There is no paper in the tray. Load paper in the tray. • The printer has stopped printing due to a major error. Check the display message. for details on the meaning of the error message.
	Blinking	• A minor error is occurring and the printer is waiting for the error to be cleared. Check the display message. When the problem is cleared, the printer resumes printing. • The toner cartridge is low. Order a new toner cartridge. You can temporarily improve print quality by redistributing the toner.

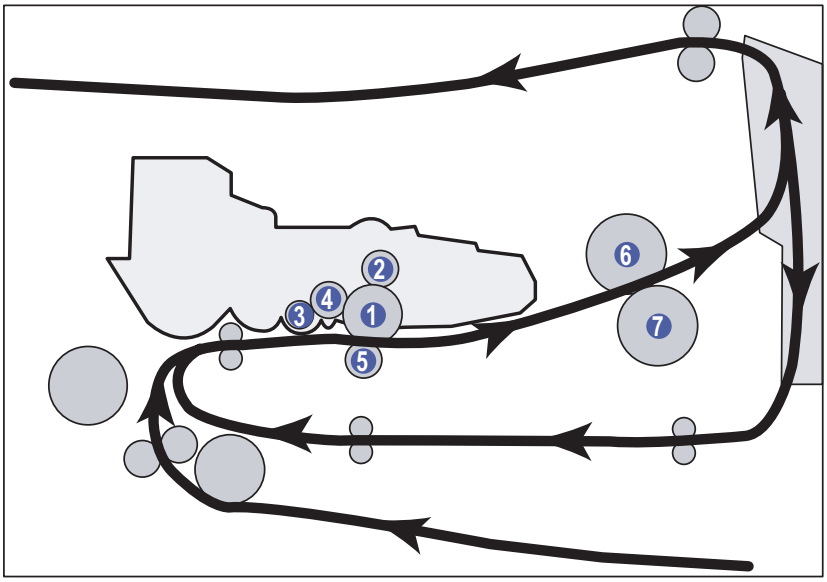
4.1.4.1 Error Message

Message	Meaning	Suggested solutions
Door Open	The front cover or rear cover is not securely latched.	Close the cover until it locks into place.
Duplex Jam 0 Check Inside	Paper has jammed during duplex printing.	Clear the jam.
Duplex Jam 1 Open/Close Door	Paper has jammed during duplex printing.	Clear the jam.
Fuser Door Open	The fuser door is not securely latched.	Open the rear cover and close the fuser door until it locks into place. For the location of the fuser door.
Install Toner	A toner cartridge is not installed.	Install a toner cartridge.
Invalid Toner	The toner cartridge you have installed is not for your printer.	Install a Samsung-genuine toner cartridge, designed for your printer.
Load Manual Press Stop Key	The multi-purpose tray is empty in manual feed mode.	Load a sheet of print material and press Stop You need to press Stop each page to be printed.
Low Heat Error Cycle Power	There is a problem in the fuser unit.	Replace to Fuser Unit.
LSU Hsync Error Cycle Power	A problem has occurred in the LSU (Laser Scanning Unit).	Replace to LSU Unit.
LSU Motor Error Cycle Power	A problem has occurred in the LSU (Laser Scanning Unit).	Replace to LSU Unit.
Main Motor Locked	There is a problem in the main motor.	Open and then close the front cover.
Open Heat Error Cycle Power	There is a problem in the fuser unit.	Unplug the power cord and plug it back in. If the problem persists, please call for service.
Over Heat Error Cycle Power	There is a problem in the fuser unit.	Unplug the power cord and plug it back in. If the problem persists, please call for service.
Paper Jam 0 Open/Close Door	Paper has jammed in the feeding area of the tray.	Clear the jam.
Paper Jam 1 Open/Close Door	Paper has jammed in the fuser area.	Clear the jam.
Paper Jam 2 Check Inside	Paper has jammed in the paper exit area.	Clear the jam.
Printing...	The printer is printing jobs using the displayed language.	Complete your printing.
Ready	The printer is on-line and ready to printer.	Use your printer.
Replace Toner	This message appears between the Toner Empty and Toner Low status.	Replace the toner cartridge with a new one.
Self Diagnostic...	The engine in your printer is checking some problems detected.	Please wait a few minutes.

Message	Meaning	Suggested solutions
Sleeping...	The printer is on power save mode.	When data is received, it switches to on-line automatically.
Toner Empty	The toner cartridge has run out. The printer stops printing.	Replace the toner cartridge with a new one.
Toner Low	The toner cartridge is almost empty.	Take out the toner cartridge and thoroughly shake it. By doing this, you can temporarily reestablish printing operations.
Tray 1 Paper Empty	There is no paper in the tray 1.	Load paper in the tray 1.
Tray 2 Paper Empty	There is no paper in the optional tray 2.	Load paper in the optional tray 2.

4.1.5 Abnormal Image Printing and Defective Roller

If abnormal image prints periodically, check the parts shown below.



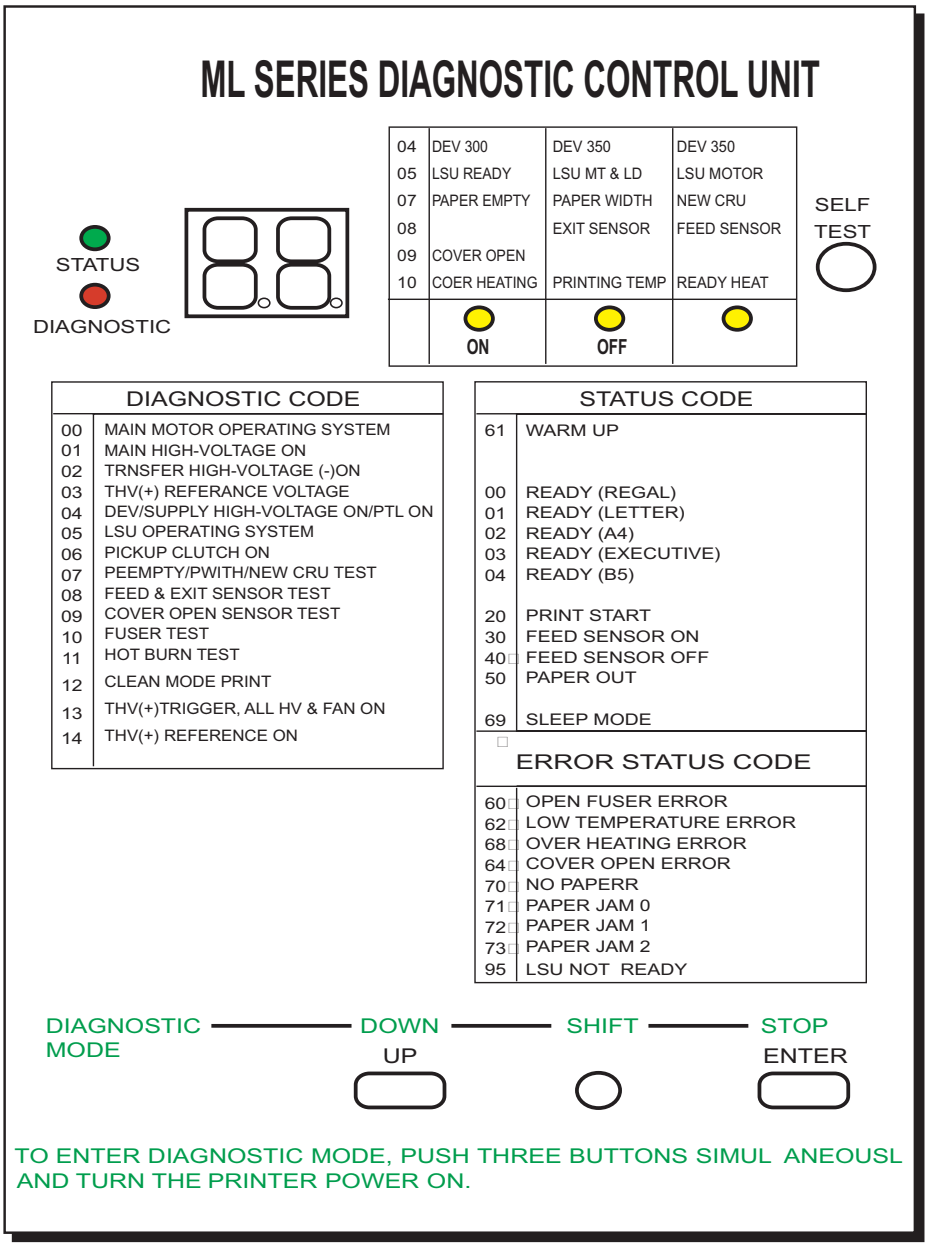
1. OPC Drum
2. Charge Roller
3. Supply Roller
4. Developing Roller
5. Transfer Roller
6. Heat Roller
7. Pressure Roller

No	Roller	Abnormal image period	Kind of abnormal image
1	OPC Drum	75.5mm	White spot, Block spot
2	Charge Roller	37.7mm	Black spot
3	Supply Roller	44.9mm	Horizontal density band
4	Develop Roller	35.2mm	Horizontal density band
5	Transfer Roller	47.1mm	Black side contamination/transfer fault
6	Heat Roller	77.8mm	Black spot and fuser ghost
7	Pressure Roller	62.8mm / 50.24mm	Black side contamination

4.1.6 How to use DCU

4.1.6.1 DCU Setup

You can examine the malfunction of the printer. To perform DCU, open the front discharge cover and leave the connect the harness wire(10 pin/4 pin) to the CN1(ML-347x) of the Main control board.



4.1.6.2 Code

Connect DCU to the printer and turn the power on. It show 7 Segment FND on the panel and each code tells the function of the printer.

1) Normal Code

While printing or warming up, it indicate the position of the paper

Code	State	Description
61	Warm up	The printer is on, the cover is open or close.
00~05	Ready(kind of paper)	The printer is ready, the paper is detected when the first paper is printed. 00: Legal ,01: Letter ,02: A4 ,03: EXEC ,04: B5 ,05: Folio, 06: A5/A6
20, 21, 22	Print Start	The engine controller received the print order from the video controller. 20: 1st, 21: MP, 22: SCF
30	Feed Sensor On	The paper is passing out of the Feed Sensor.
40	Feed Sensor off	The paper has passed out of the Feed Sensor.
50	Paper Out	The paper has passed out of Exit Sensor.
69	Sleep Mode	The fuser power turned off to minimize the power consumption.

2) Error Code

When detecting the malfunction, the printing is stopped to indicate error code.

Code	State	Description
60, 62, 68	Fuser Error	The error in the fuser occurred. There is a short circuit in the thermistor and the thermostat while printing, Low Temperature Error occurs. • 60: Open Fuser Error • 62: Low Heat Error • 68: Over Heat Error
64	Cover Open	The Printer Cover is open.
65	CRU Error	The Toner Cartridge not installed,
70	No Paper	No paper in the paper cassette.
71	Paper Jam 0	The front part of paper is jammed between pickup unit and Feed sensor.
72	Paper Jam 1	The front part of paper is jammed between the Discharge sensor and Feed sensor.
73	Paper Jam 2	The front part of paper is jammed just after passing through the discharge sensor.
76	Out Bin Full	The Out bin is filled with paper.
95	LSU Not Ready	LSU Scanner Motor not ready or Hsync signal not output.

4.1.6.3 Self Diagnostic Mode

If Error code occurs due to malfunction of the printer, perform Self Diagnostic Mode to solve the problem.

The printer works only in the self-test mode to solve the malfunction problem.
To enter the self-test mode, turn the power on pressing the buttons of [Down], [Shift] and [Stop] at the same time. Release the button within 2 or 3 seconds if 78 shows in the DCU. If 00 shows in the DCU, press the button [Up] or [Shift] to select the self+test , and press the button of [Enter] to operate. To stop, press the button of [shift] and [Enter] together.

Code	Description
00	**Main Motor Operating System** Only the main motor is in operation.
01	**Main High Voltage On(THV-)** -1400 voltage output by MHV terminal. Caution : High voltage probe should be used.
02	**Transfer High Voltage(-)On(THV-)** -1000 voltage output by MHV terminal. Caution : High voltage probe should be used.
03	**Transfer High Voltage (+)Reference on (THV +)** +1300 voltage output by MHV terminal. Caution : High voltage probe should be used.
04	**DEV/supply High Voltage** : DEV/Supply High Voltage Test. The left one of the three LEDs in the self-test panel is on when DEV high voltage Supply high voltage output by each HV terminal. Press the [Up] button to switch the voltage. The middle and right one of the three LEDs are on and -350 voltage output by DEV HV terminal. Caution : High voltage probe should be used.
05	**LSU Operating System** The scanning motor of LSU is in operation, the right LED of the three buttons on. Press the [Up] button to Check LD. LD is functioning and the middle button is on. If the LD is normal, all LEDs are on.
06	**Pickup clutch on** The Solenoid in the printer is in operation. To stop the operation, Press the button [shift] and [Enter] together.

Code	Description
07	Paper Empty Sensor Test : If activate the Actuator of the PEMPTY Sensor, the left and right of the three LEDs are on. Paper Empty Sensor ON/OFF 1st LED ON/OFF
08	Feed & Exit Sensor Test Test the Feed sensor and Discharge sensor in the same way as '07'. Feed Sensor ON/OFF 2nd LED ON/OFF Exit Sensor ON/OFF 3rd LED ON/OFF
09	Cover Open Sensor Test Test the Cover Open Sensor in th same way as code '07' Cover Open Sensor ON/OFF1st LED ON/OFF
10	Fuser Test If the [Enter] button pressed, the right LED is on and temperature of the fuser is up to READY Mode. If the [Up] button pressed, the middle LED is on and temperature of the fuser is up to Printing Mode. If you press the button once more, the left LED is on and temperature of the fuser is up to overheat Mode.
11	Hot Burn Test If the [enter] button pressed, the printer is continuously printing without detection. Turn the power off to stop operation.
12	Cleaning Mode Print Mode Print the paper to clean the OPC Drum in the Cartridge.
13	THV(+) TRIGGER. ALL HV : All high voltage output by each HV terminal and LSU and the fan is in operation. In this mode, electronic resistance of transfer roller and high voltage is detected.
14	PTL Test : (ML-1610 : not design) Indicates the function of the PTL, same method of the code ‘07’.
15	Fan Test : Indicates the function of the Fan, same method of the code ‘07’.
16	Manual Pickup Test : Indicates the function of th Manual Pickup, same method of the code ‘07’.
17	Manual Sensor Test : Indicates the function of the Manual Sensor, same method of the code ‘07’.

No.	Function	Enter	Up/Down			Stop	Remark
00	Motor	Motor Run				Motor Stop	
01	MHV	Mhv On				Mhv Off	-1300V
02	THV(-)	Thv Negative On				Thv Negative Off	-1000V
03	THV(+)	Thv On				Thv Off	+1300V
04	DEV	Dev On	Supply	DEV		Dev Off	-350V
			0 : -550V	0 : -350V			
05	LSU	LSU Run	● On	● Off	● Ready	LSU Stop	020mV
06	PickUp	Pickup On				Pickup Off	
07	PEmpty		● Paper Empty	●	●		
08	Sensor		●	● Exit	● Feed		
09	Cover		● Cover Open	●	●		
10	Fuser	Fuser On				Fuser Off	
11	Hot Burn	Hot Burn On					
12	Clean Print	Clean Printing					
13	Thv Reference		● low	● adequate	● high		
14	PTL	PTL On				PTL Off	PTL No
15	FAN	Fan On				Fan Off	
16	Manual PickUp	Manual Pickup On				Manual Pickup Off	
17	Manual Sensor		● Manual Sensor	●	●		

<DCU Function Table>

4.1.6.4 Self Test Button

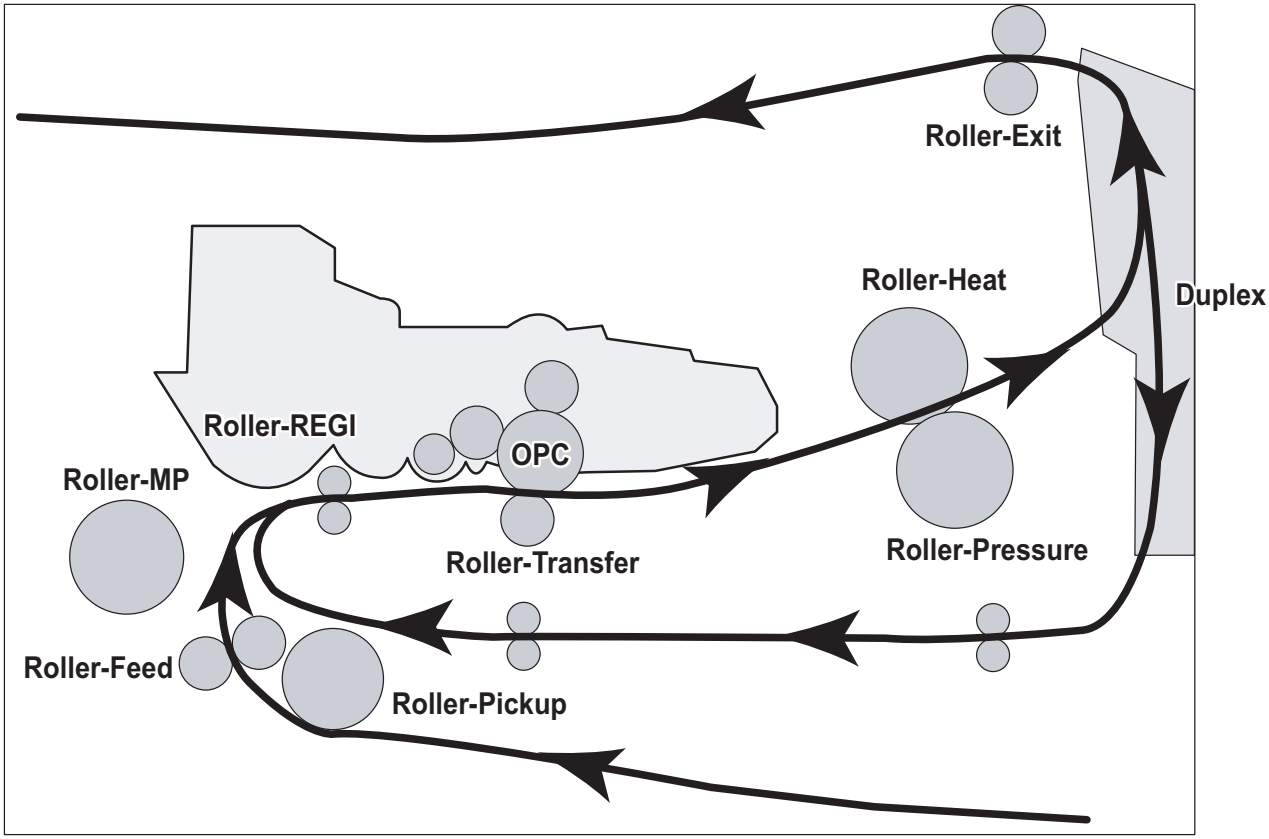
If the Self-Test button pressed, vertical lines are printed.

Turn the power on while pressing this button, '89' shows in the DCU and the printer is warming up. After warming-up the printer is in READY Mode, and '88' shows in the DCU. In this mode, without any detection, the printer begins printing(trial printing and data from the PC). It is convenient to use this mode when the engine malfunction is detected in the control board.

4.1.7 Paper Jam

4.1.7.1 Clearing paper jams

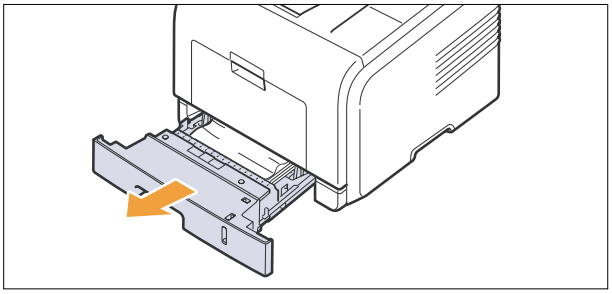
Message	Location of Jam
Paper Jam 0 Open/Close Door	In the paper feed area (tray 1, optional tray 2, multi-purpose tray)
Paper Jam 1	Around the toner cartridge
Open/Close Door Paper Jam 2	Check Inside In the paper exit area
Duplex Jam 0 Check Inside a	In the duplex area
Duplex Jam 1 Open/Close Door[a]	Between the duplex unit and fuser area



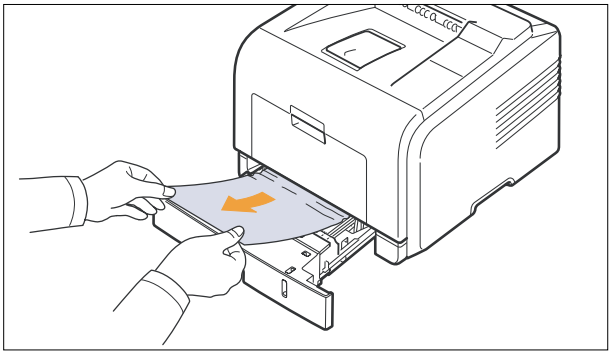
4.1.7.2 In the paper feed area

In the tray 1

1. Pull the tray 1 open.



2. Remove the jammed paper by gently pulling it straight out. Make sure that all of the paper is properly aligned in the tray 1.



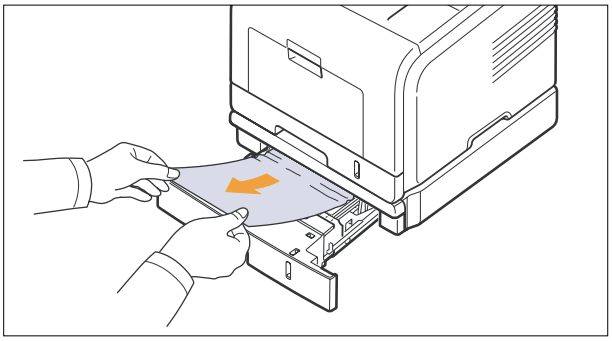
If the paper does not move when you pull, or if you do not see the paper in this area, check the fuser area around the toner cartridge.

3. Insert the tray 1 into the printer until it snaps into place. Printing automatically resumes.

In the optional tray 2

1. Pull the optional tray 2 open.

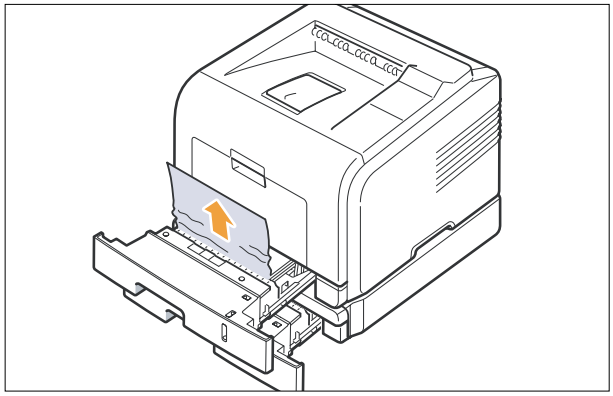
2. Remove the jammed paper from the printer.



If the paper does not move when you pull, or if you do not see the paper in this area, stop and go to step 3.

3. Pull the tray 1 half.

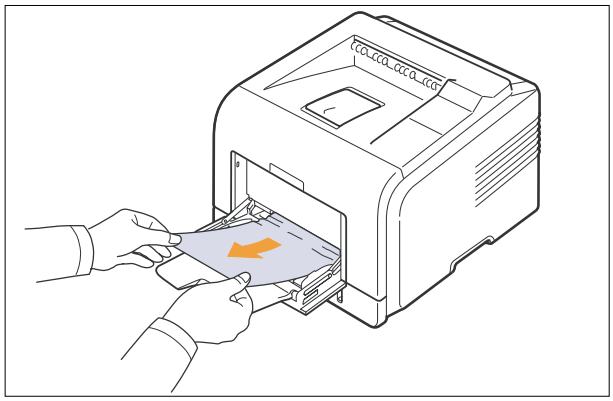
4. Pull the paper straight up and out.



5. Insert the trays back into the printer. Printing automatically resumes.

In the multi-purpose tray

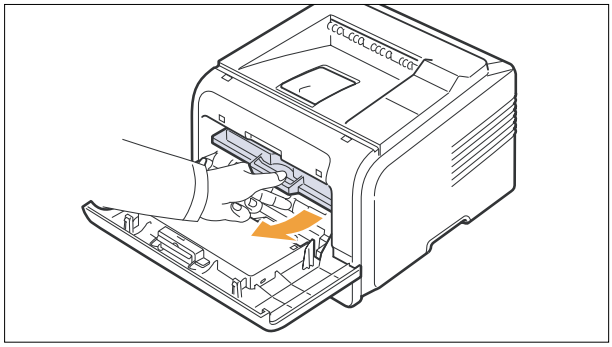
1. If the paper is not feeding properly, pull the paper out of the printer.



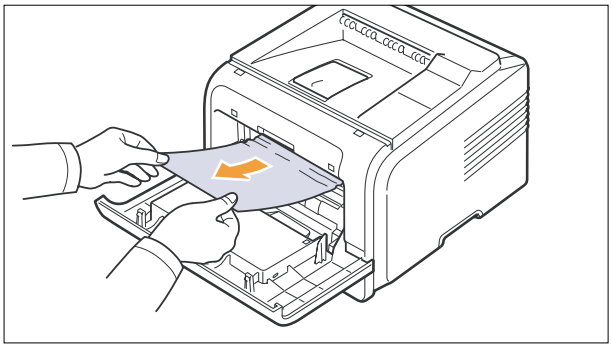
2. Open and close the front cover to resume printing.

4.1.7.3 Around the toner cartridge

1. Open the front cover and pull the toner cartridge out.



2. Remove the jammed paper by gently pulling it straight out.

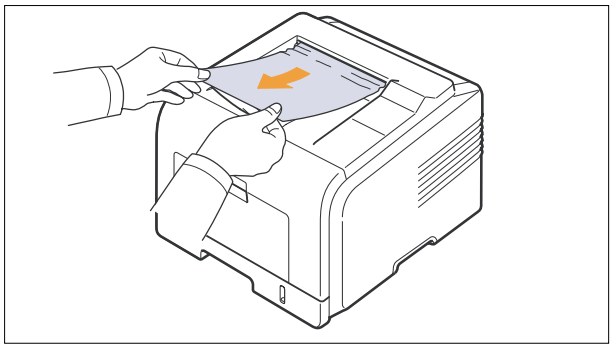


3. Replace the toner cartridge and close the front cover. Printing automatically resumes.

4.1.7.4 In the paper exit area

1. Open and close the front cover. The jammed paper is automatically ejected from the printer.

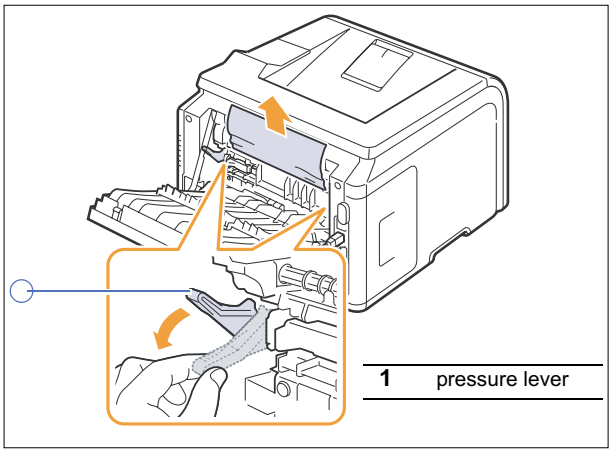
2. Gently pull the paper out of the output tray.



If you do not see the jammed paper or if there is any resistance when you pull, stop and go to the next step.

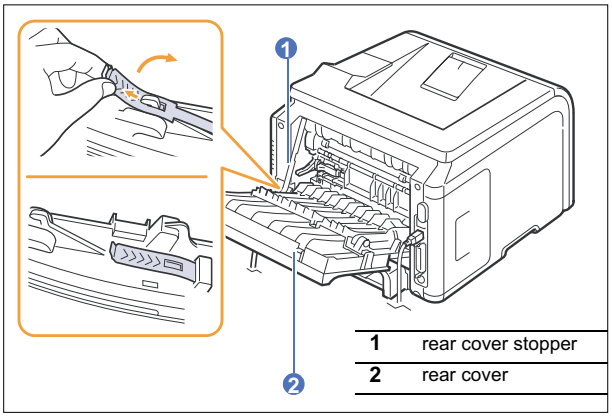
3. Open the rear cover.

4. If you see the jammed paper, push the pressure lever on each side up and remove the paper. Return the pressure lever to its original position and skip the step 10.

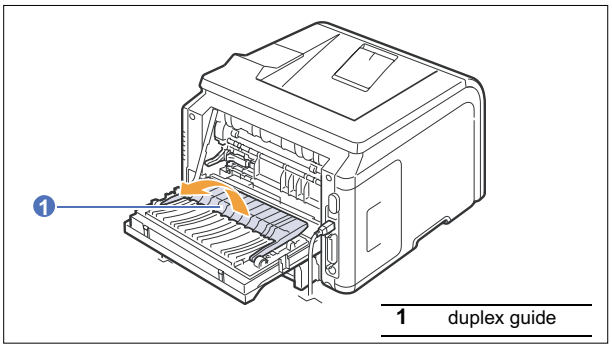


If you still do not see the paper, go to the next step.

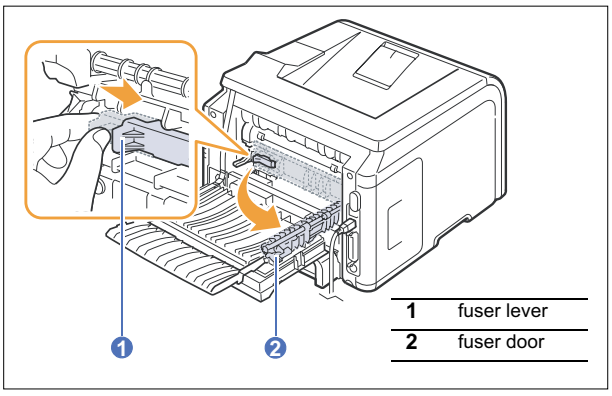
5. Release the blue strap, the rear cover stopper, and fully open the rear cover, as shown.



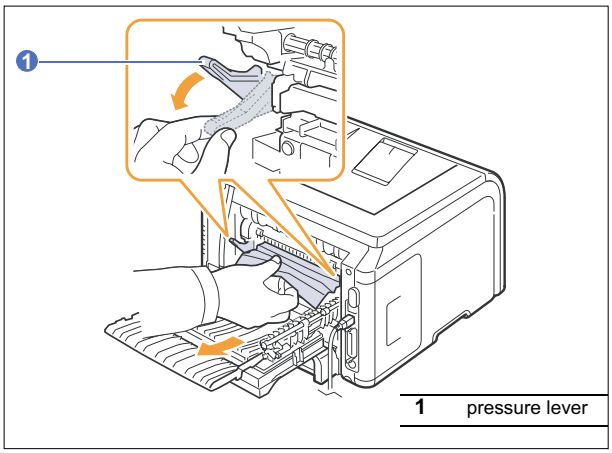
6. Unfold the duplex guide fully.



7. While pushing the fuser lever to the right, open the fuser door.



8. Pull the jammed paper out.
   If the jammed paper does not move when you pull, push the pressure lever on each side up to loose the paper, and then remove it.



9. Return the lever, door, stopper, and guide to their original position.

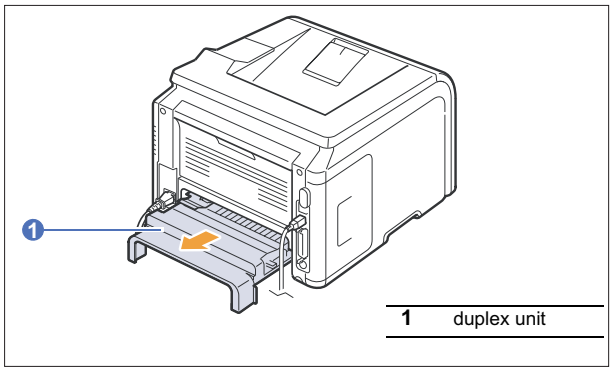
10. Close the rear cover. Printing automatically resumes.

4.1.7.5 In the duplex unit area

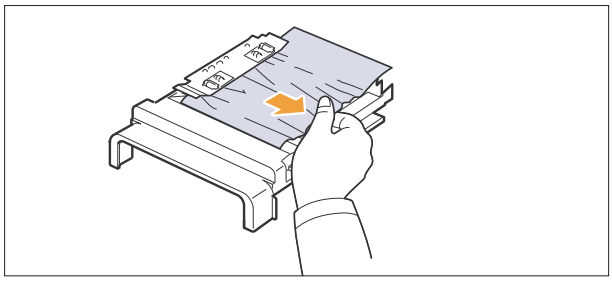
If the duplex unit is not inserted correctly, paper jam may occur. Make sure that the duplex unit is inserted correctly.

Duplex jam 0

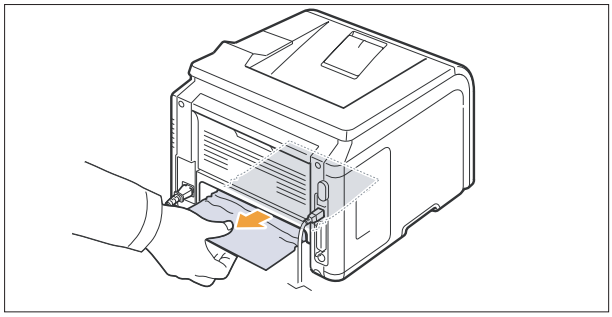
1. Pull the duplex unit out of the printer.



2. Remove the jammed paper from the duplex unit.



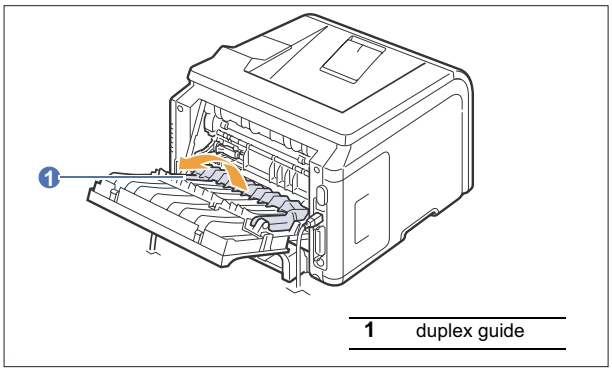
If the paper does not come out with the duplex unit, remove the paper from the bottom of the printer.



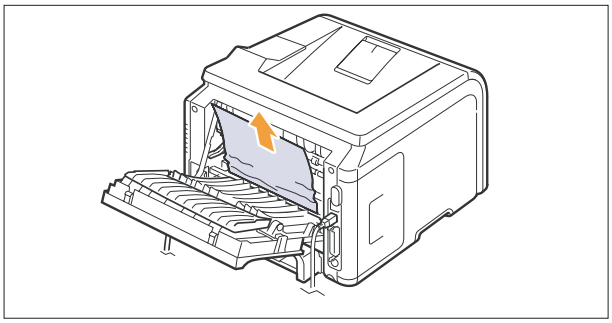
Duplex jam 1

1. Open the rear cover.

2 Unfold the duplex guide fully.



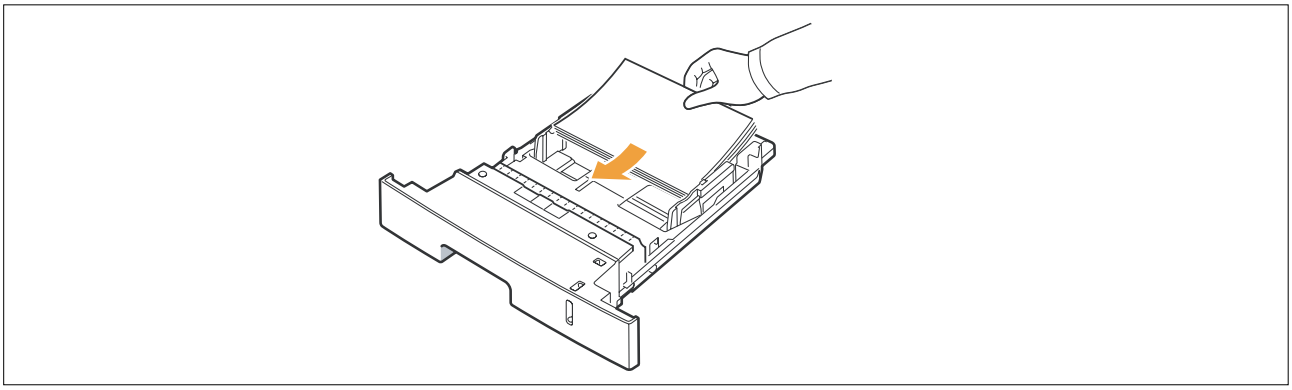
3. Pull the jammed paper out.



4.1.7.6 TiPs for avoiding paper jams

By selecting the correct media types, most paper jams can be avoided.

- Follow the procedures on page 5.5. Ensure that the adjustable guides are positioned correctly.
- Do not overload the tray. Ensure that the paper level is below the paper capacity mark on the inside wall of the tray.
- Do not remove paper from the tray while your printer is printing.
- Flex, fan, and straighten paper before loading.
- Do not use creased, damp, or highly curled paper.
- Do not mix paper types in a tray.
- Use only recommended print media.
- Ensure that the recommended print side of print media is facing down in the tray, or facing up in the multi-purpose tray.
- If paper jams occur frequently when you print on A5-sized paper: Load the paper into the tray with the long edge facing the front of the tray.



In the printer properties window, set the page orientation to be rotated 90 degrees.

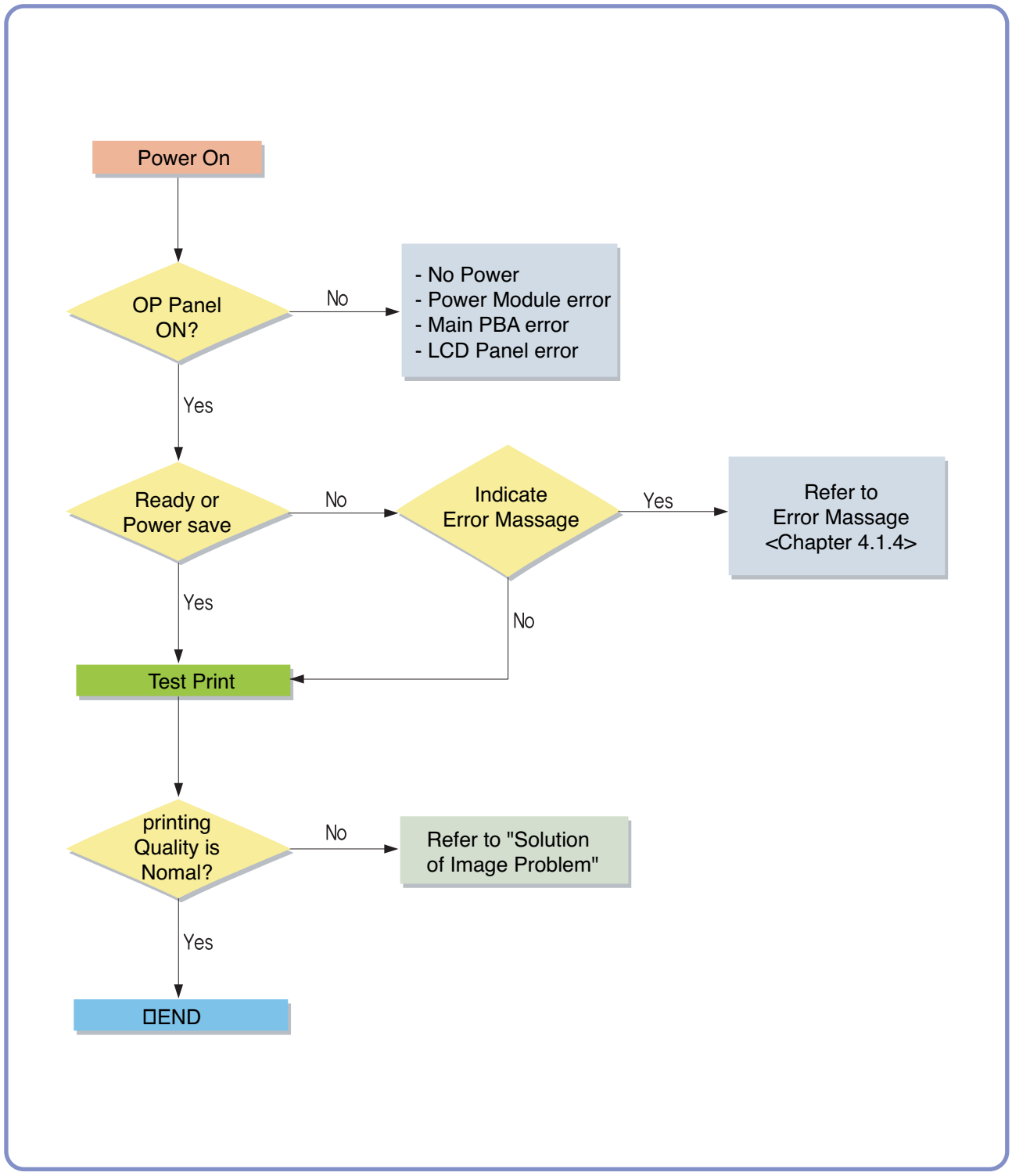
4.1.8 Download & Reset F/W

Firmware download method		
Normal Download method	LCD Panel	1. In Dos Prompt types "Usblist2 [Rom file name]" and Press Enter 2. In LCD "Flash Upgrade..." message will be show up. 3. In LCD "Update Image Please Wait..." message will be show up. 4. When download complete, set will be automatically power On/Off and it'll Warming Up
Boot Download method	LCD Panel	1. While Pressing Stop key, Power On the Printer 2. After verify the message "Download Mode Press Stop key" Press Stop Key 3. Verify the message "Download Mode Plese Send IMG..." 4. In Dos Prompt types "Usblist2 [Rom file name]" and Press Enter 5. In LCD "Update Image Please Wait..." message will be show up. 6. When download complete, set will be automatically power On/Off and it'll Warming Up
Reset method		
LCD Panel		1. In LCD "Update Image Please Wait..." message will be show up. 2. In LCD message Ready¡ Printing then print out configuration page 3. Check the OS version and total page value is "0" 4. Please set power On/Off

4.2 Troubleshooting

4.2.1 Procedure of Checking the Symptoms

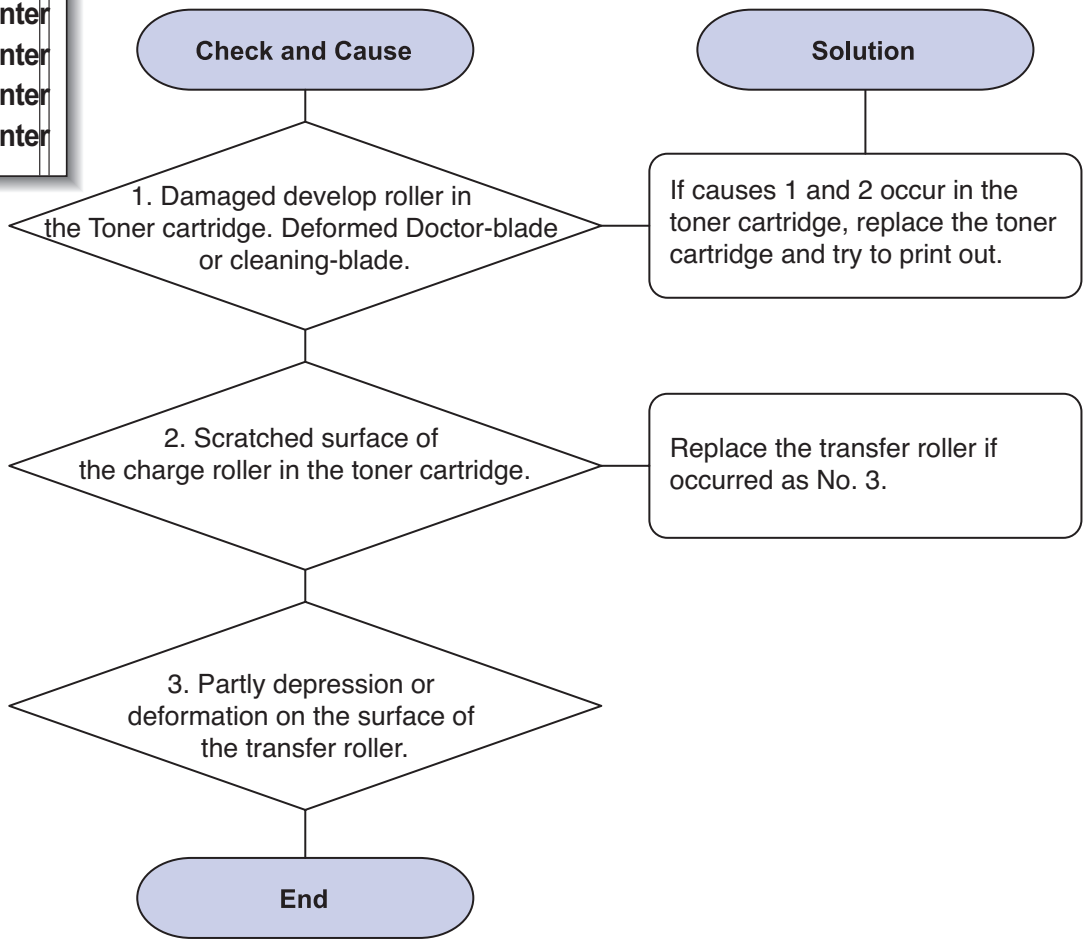
Before attempting to repair the printer first obtain a detailed description of the problem from the customer.



4.2.2 The cause and solution of Bad image

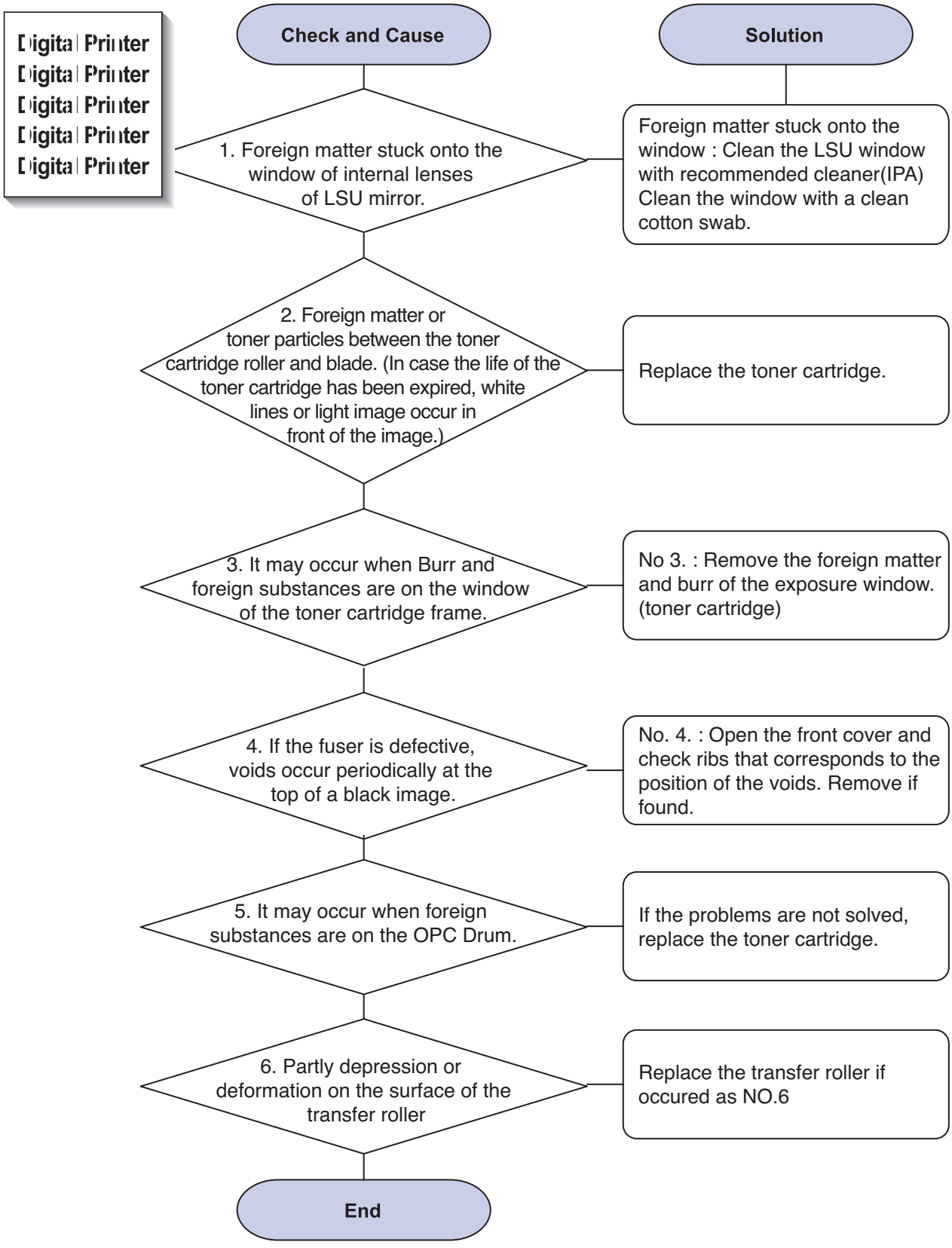
1) Vertical Black Line and Band

Description: 1. Straight thin black vertical line occurs in the printing.
2. Dark black vertical band occur in the printing.



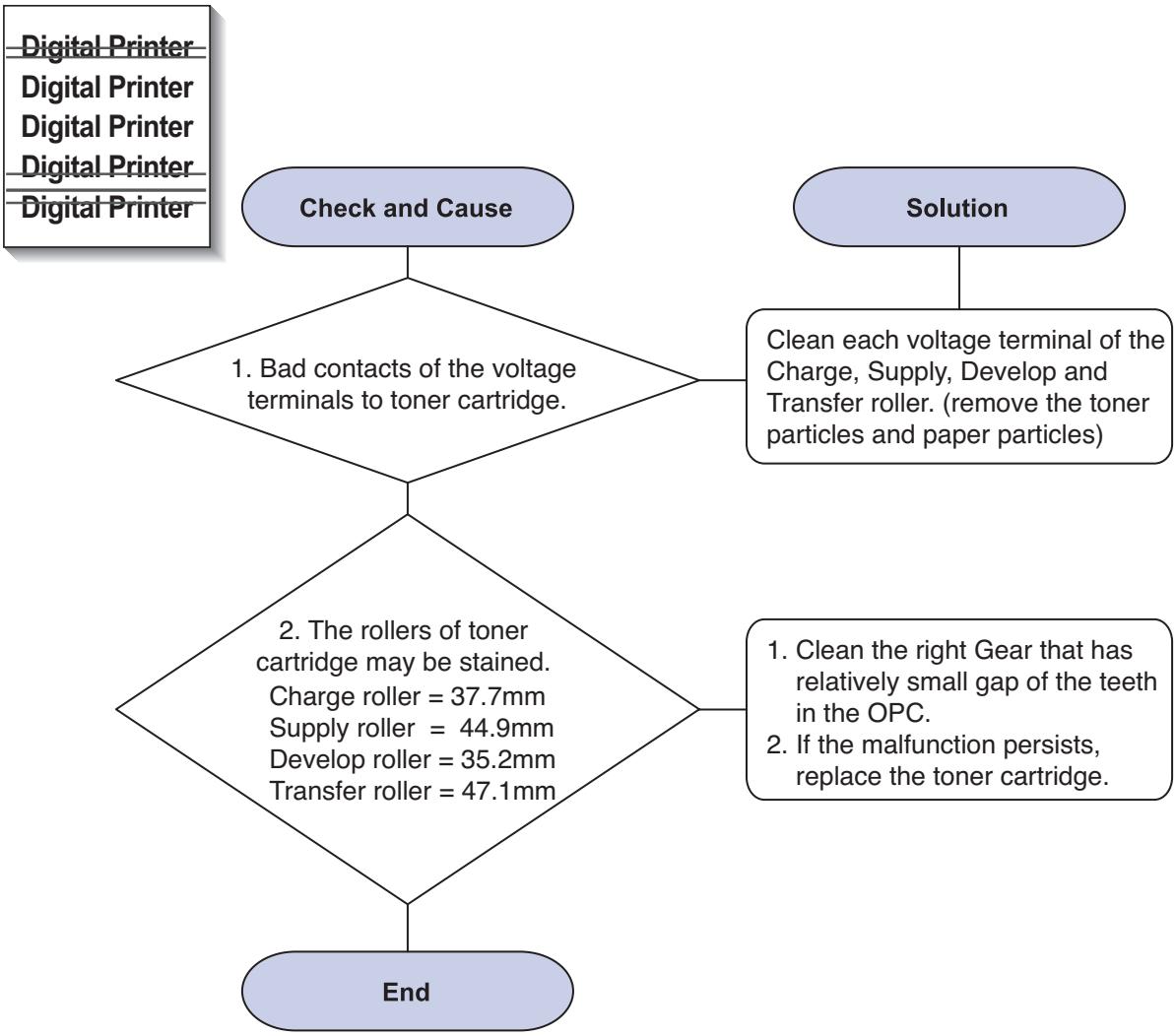
2) Vertical White Line

Description: White vertical voids in the image.



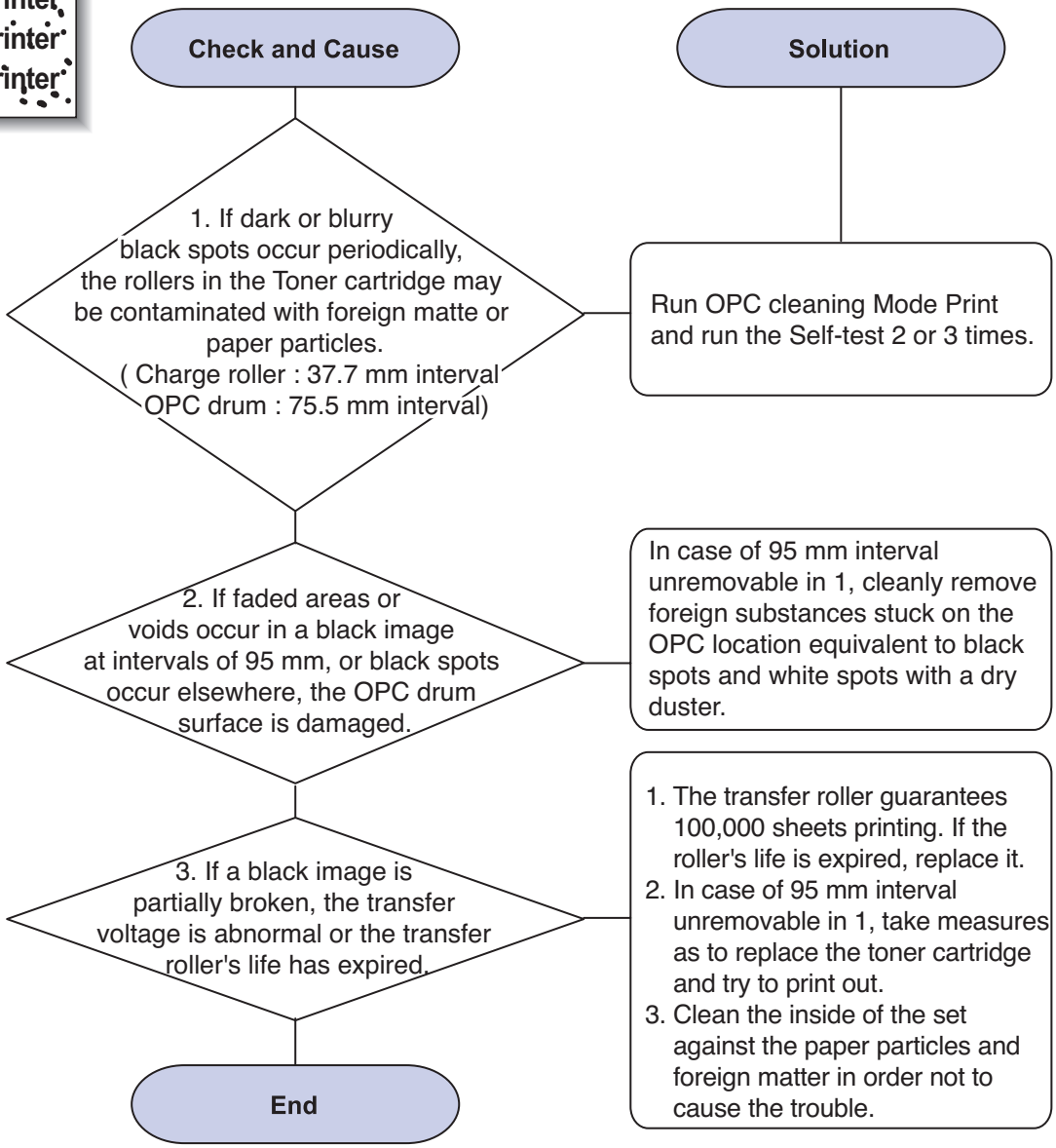
3) Horizontal Black Band

Description: Dark or blurry horizontal stripes occur in the printing periodically.
(They may not occur periodically.)



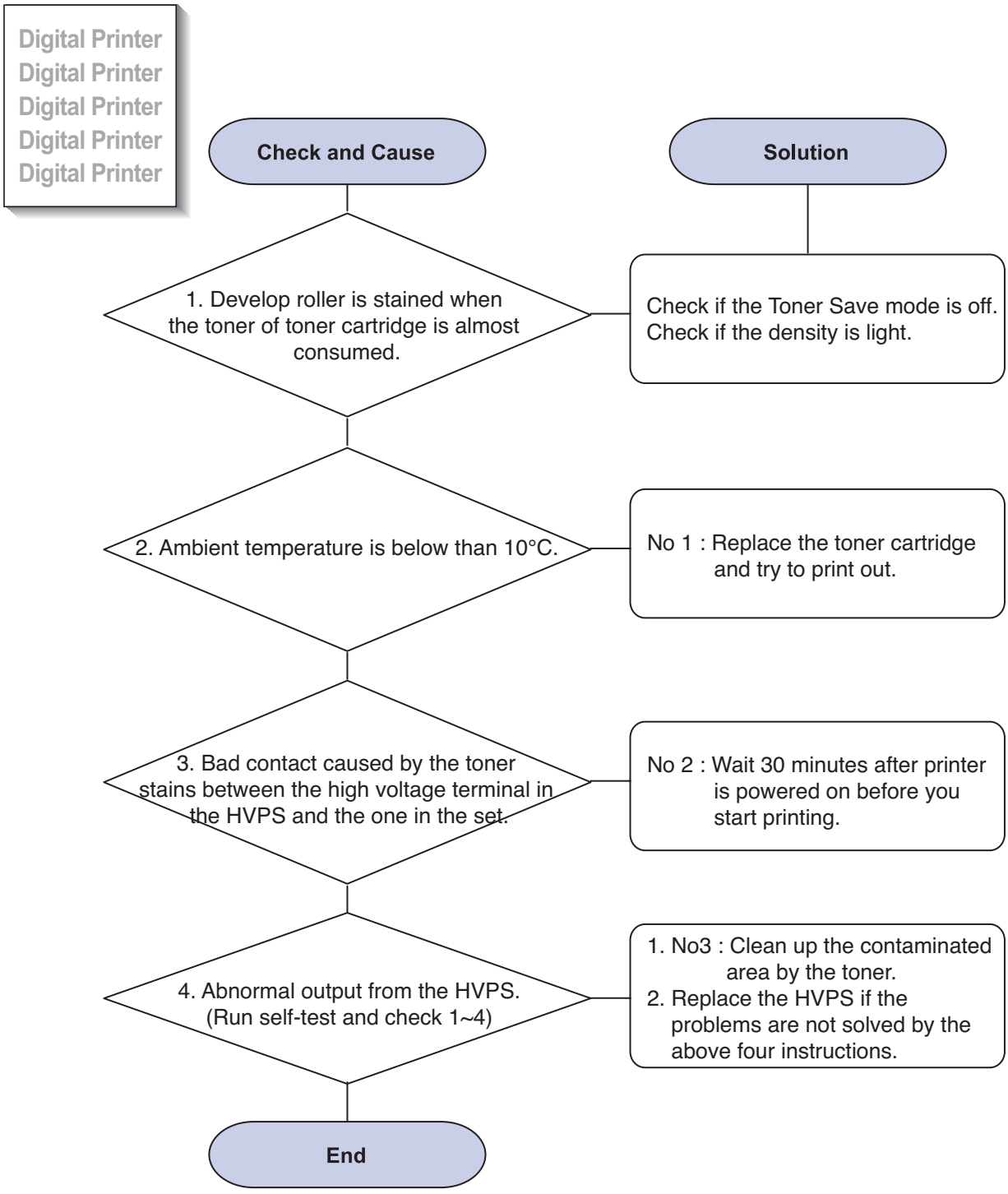
4) Black/White Spot

Description: 1. Dark or blurry spots occur periodically in the printing
2. White spots occur periodically in the printing



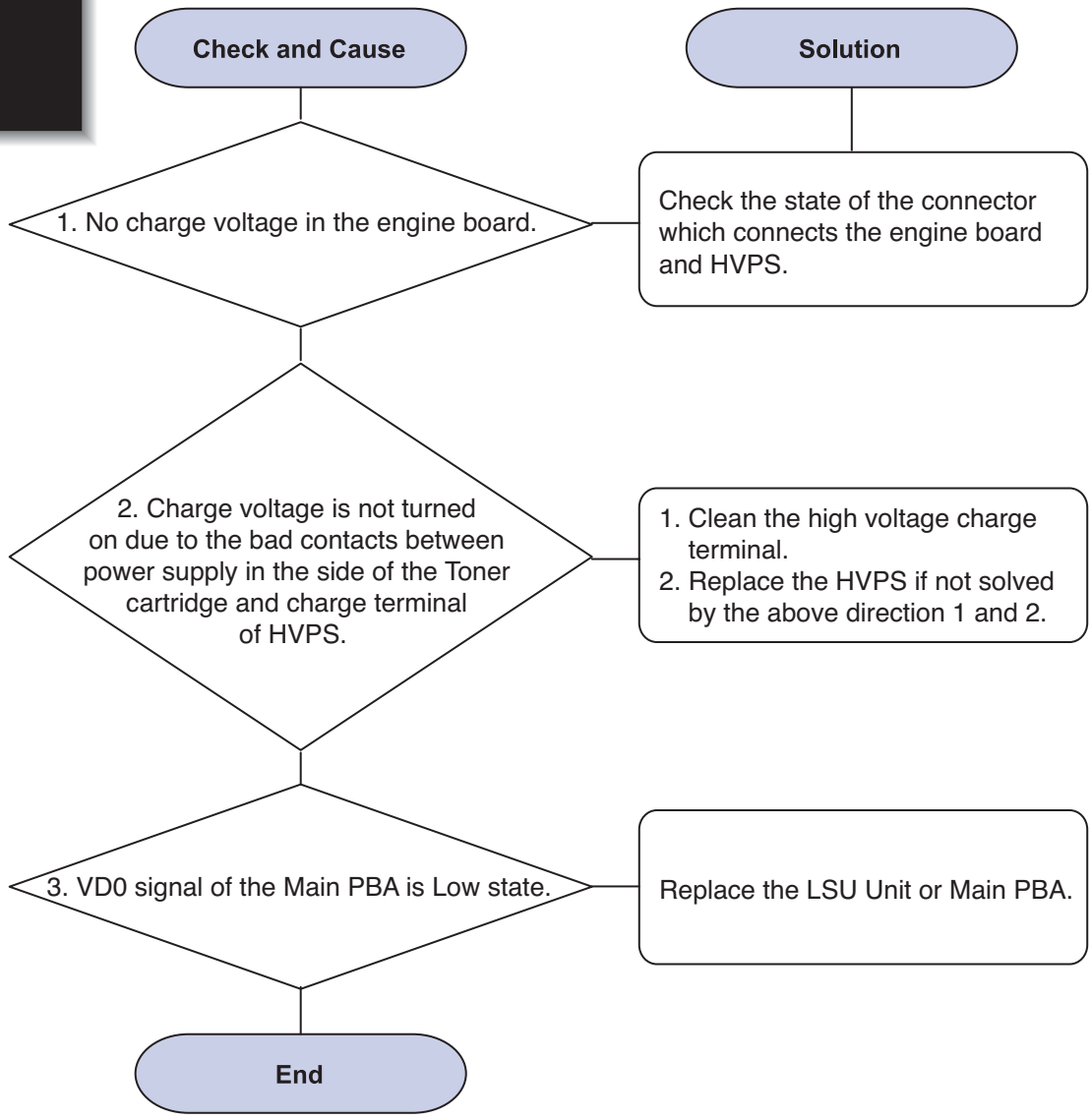
5) Light Image

Description: The printed image is light, with no ghost.



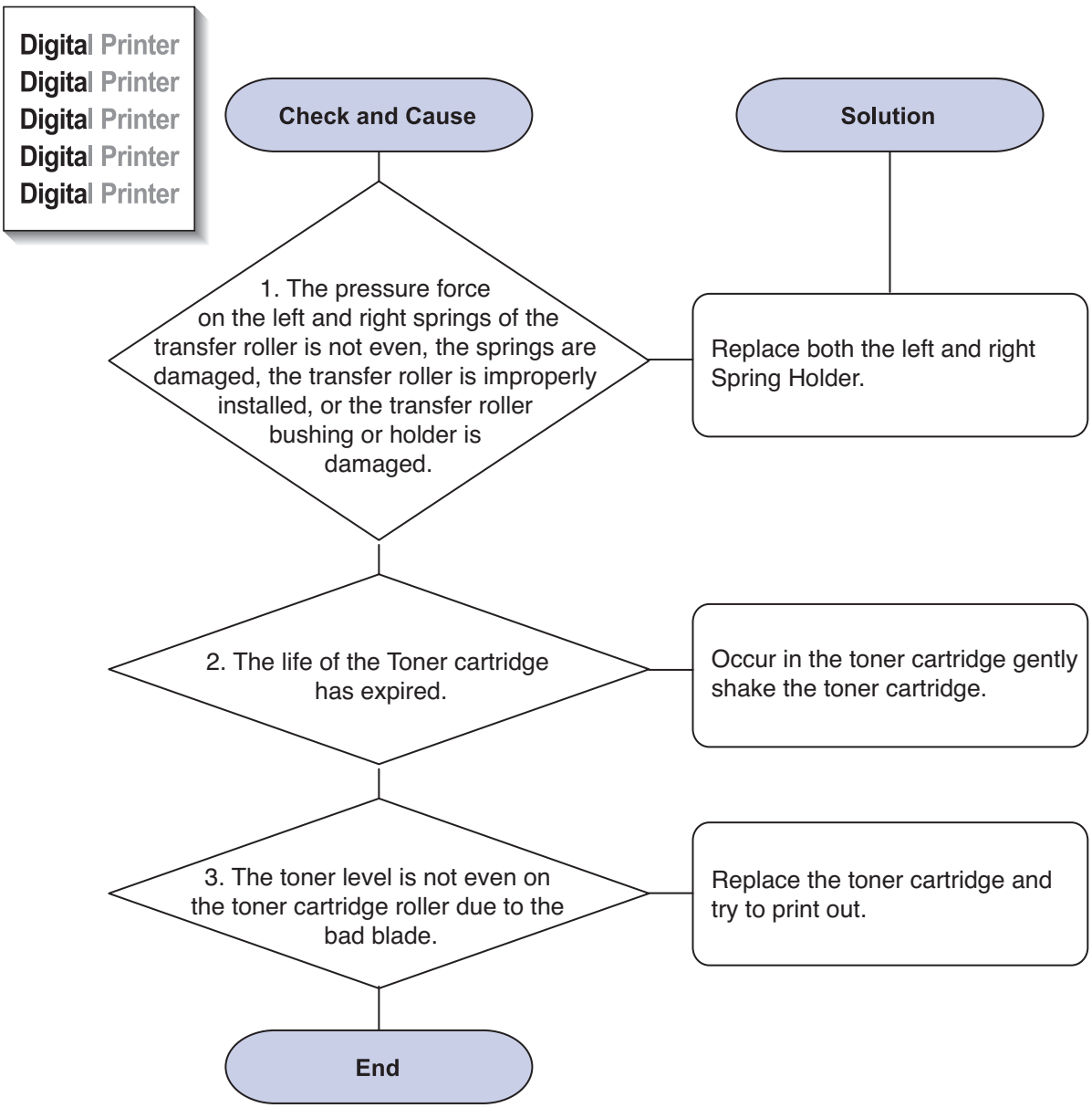
6) Dark Image or a Black Page

Description: The printed image is dark.



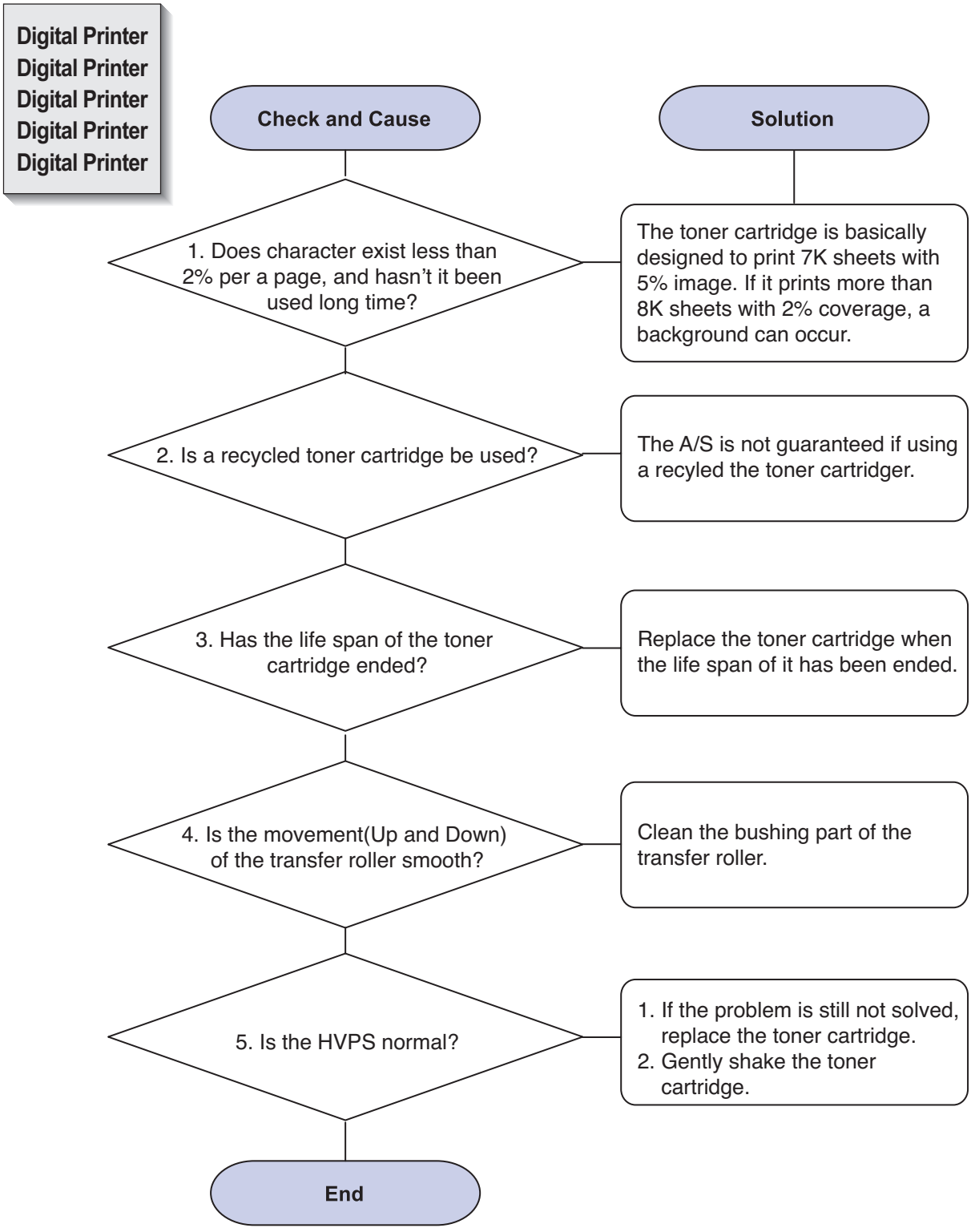
7) Uneven Density

Description: Print Density is uneven between left and right.



8) Background

Description: Light dark background appears in whole area of the printing.

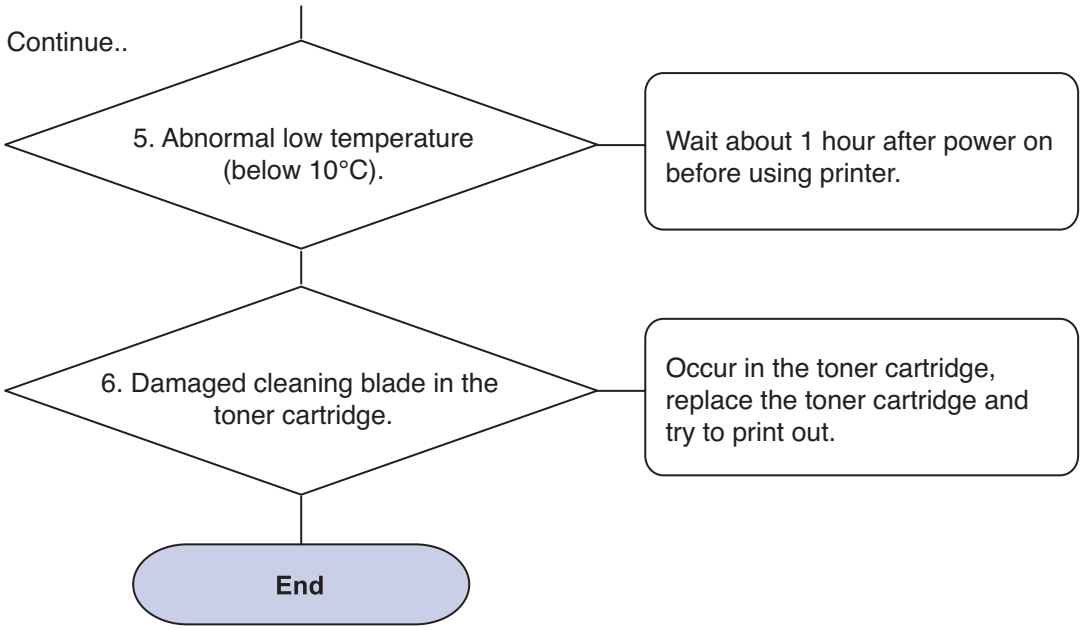


9) Ghost (1)

Description: Ghost occurs at 95 mm intervals of the OPC drum in the whole printing.

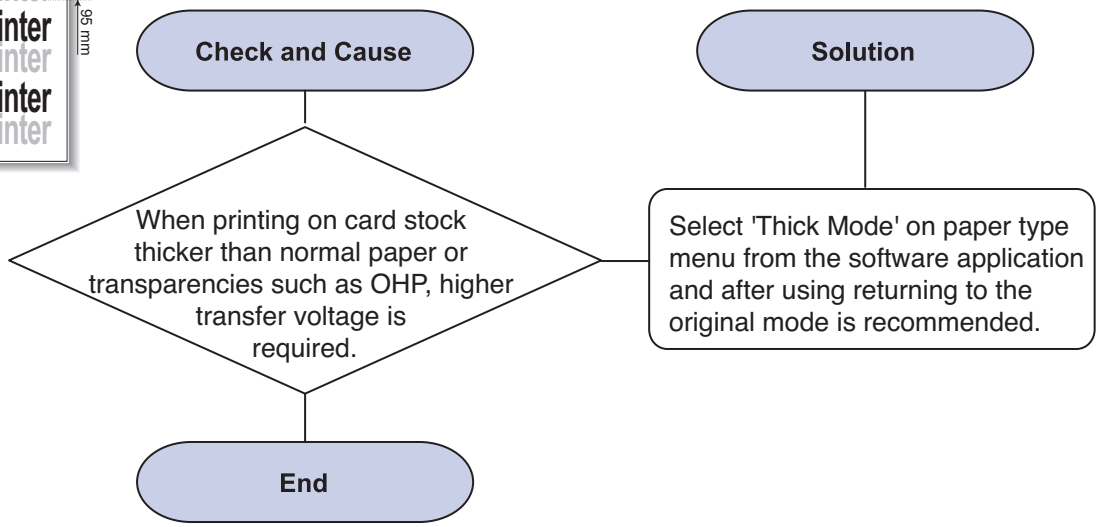
Check and Cause	Solution
1. Bad contacts caused by contamination from toner particles between high voltage terminal in the main body and the electrode of the Toner cartridge.	Clean the terminals when contaminated by toner particles.
2. Bad contacts caused by contamination from toner particles between high voltage terminal in the main body and the one in the HVPS board.	Occur in the toner cartridge, replace the toner cartridge and try to print out.
3. The life of toner cartridge is expired.	Replace the engine board if not solved by the above directions 1-2.
4. Transfer roller lifetime(70K sheets) has expired.	If not solved by the direction 3, check the transfer roller lifetime and replace it.

Continue..


Continue..
5. Abnormal low temperature (below 10°C).
Wait about 1 hour after power on before using printer.
6. Damaged cleaning blade in the toner cartridge.
Occur in the toner cartridge, replace the toner cartridge and try to print out.
End

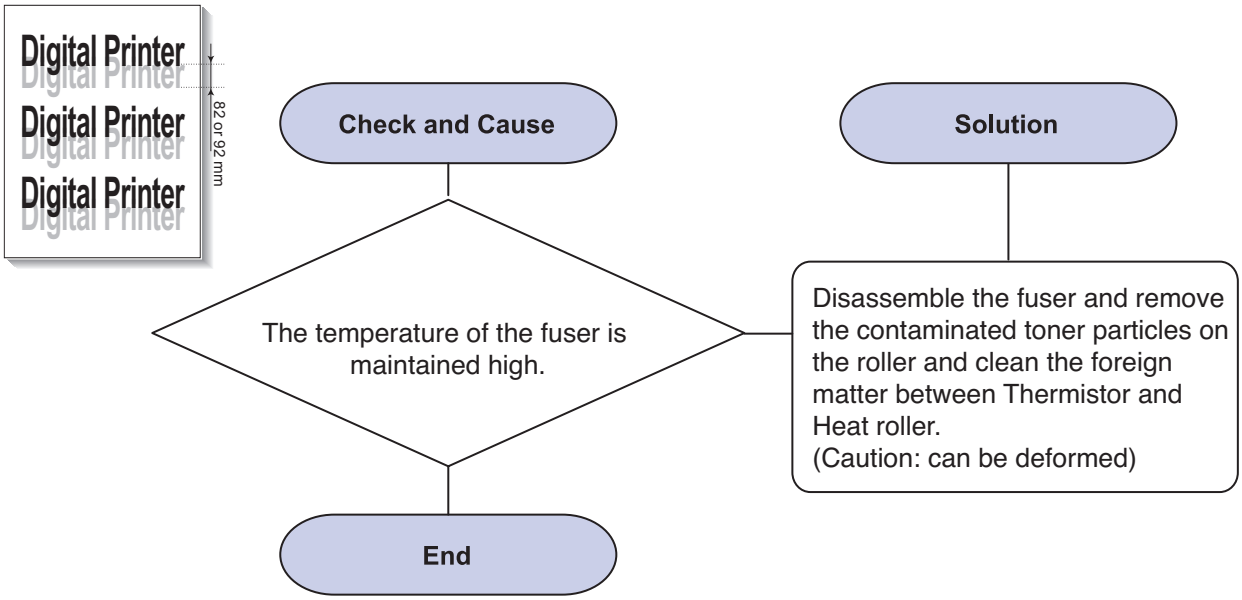
10) Ghost (2)

Description: Ghost occurs at 95 mm intervals of the OPC drum in the whole printing.
(When printing on card stock or transparencies using manual feeder)



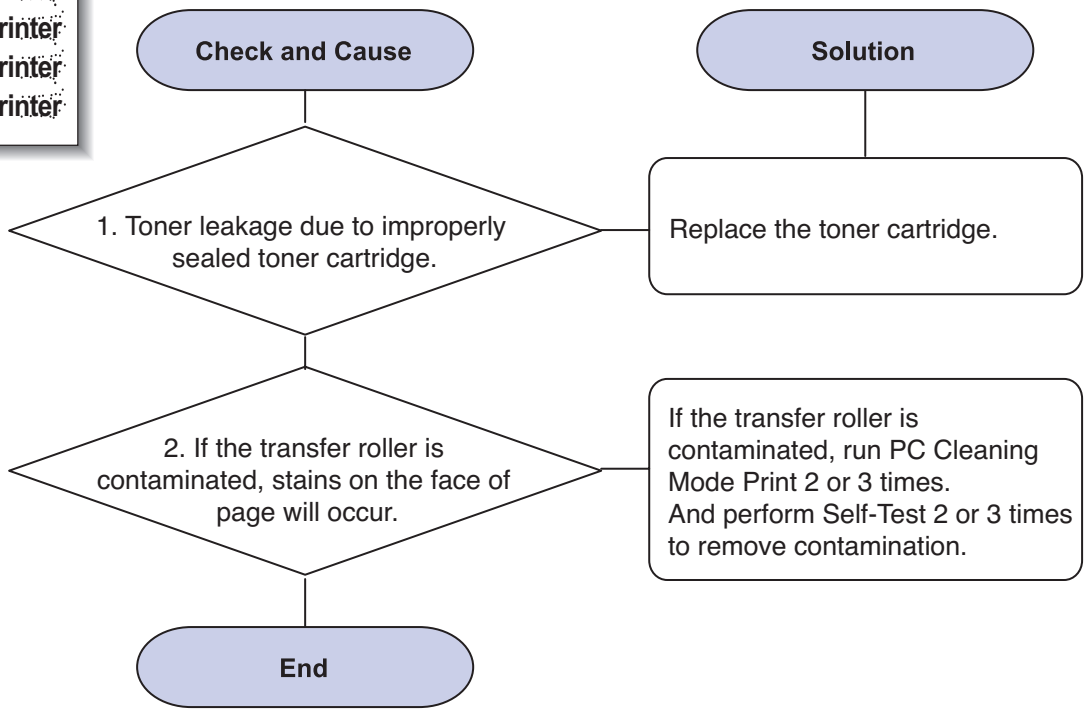
11) Ghost (3) : Fuser

Description: Ghost occurs at 82 or 92 mm intervals.



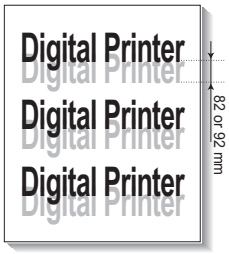
12) Stains on the Face of Page

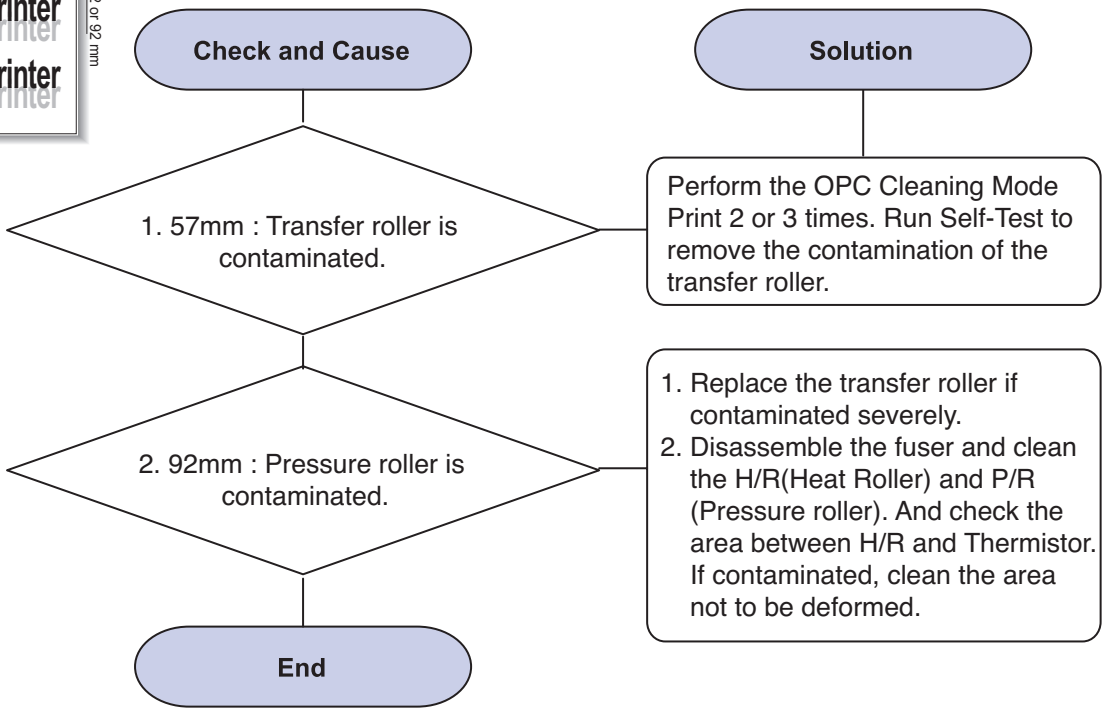
Description: The background on the face of the printed page is stained.



13) Stains on Back of Page

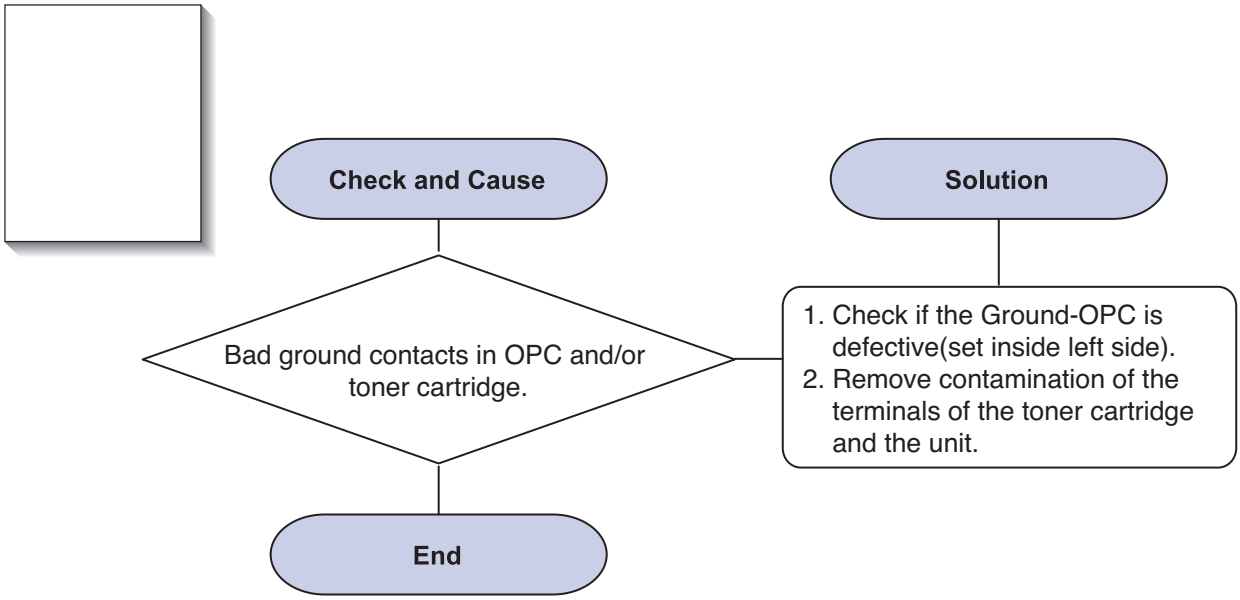
Description: The back of the page is stained at 57 or 92 mm intervals.





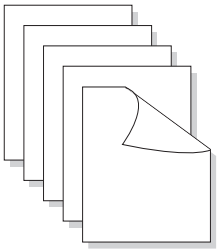
14) Blank Page Print out (1)

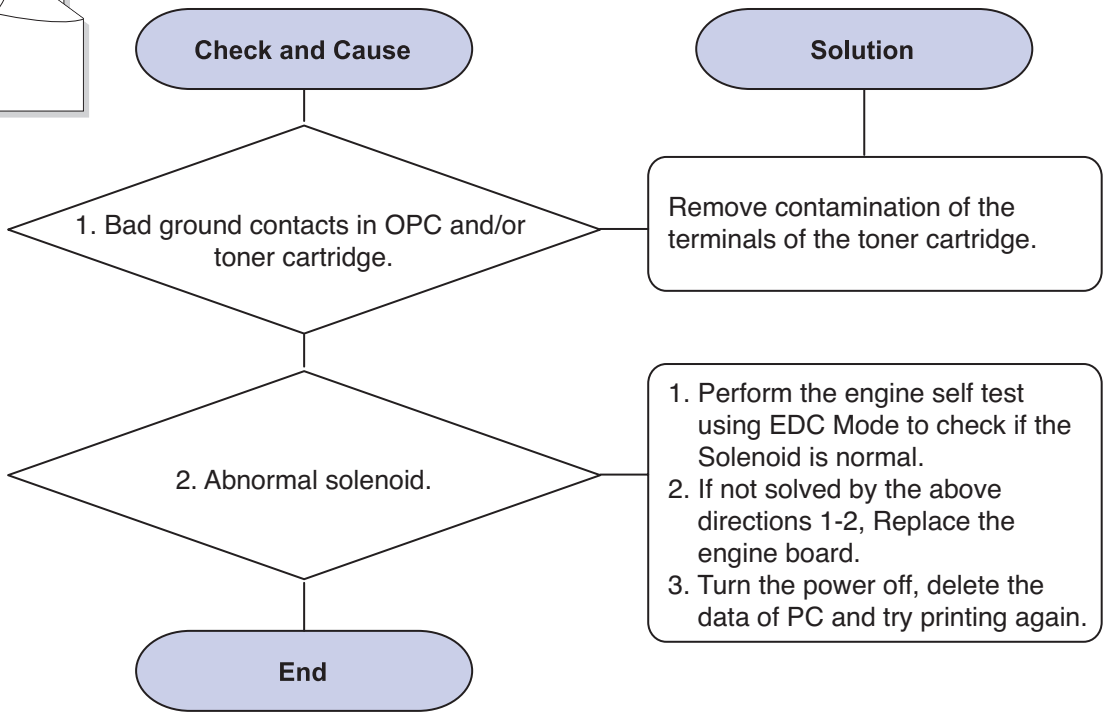
Description: Blank page is printed.



15) Blank Page Print out (2)

Description: 1. Blank page is printed.
2. One or several blank pages are printed.
3. When the printer turns on, several blank pages print.

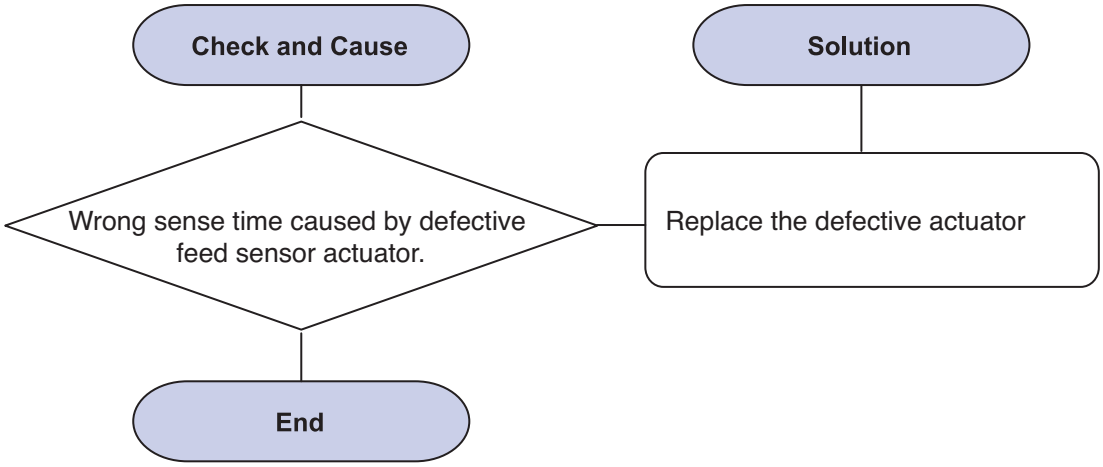




4.2.3 The cause and solution of the bad discharge

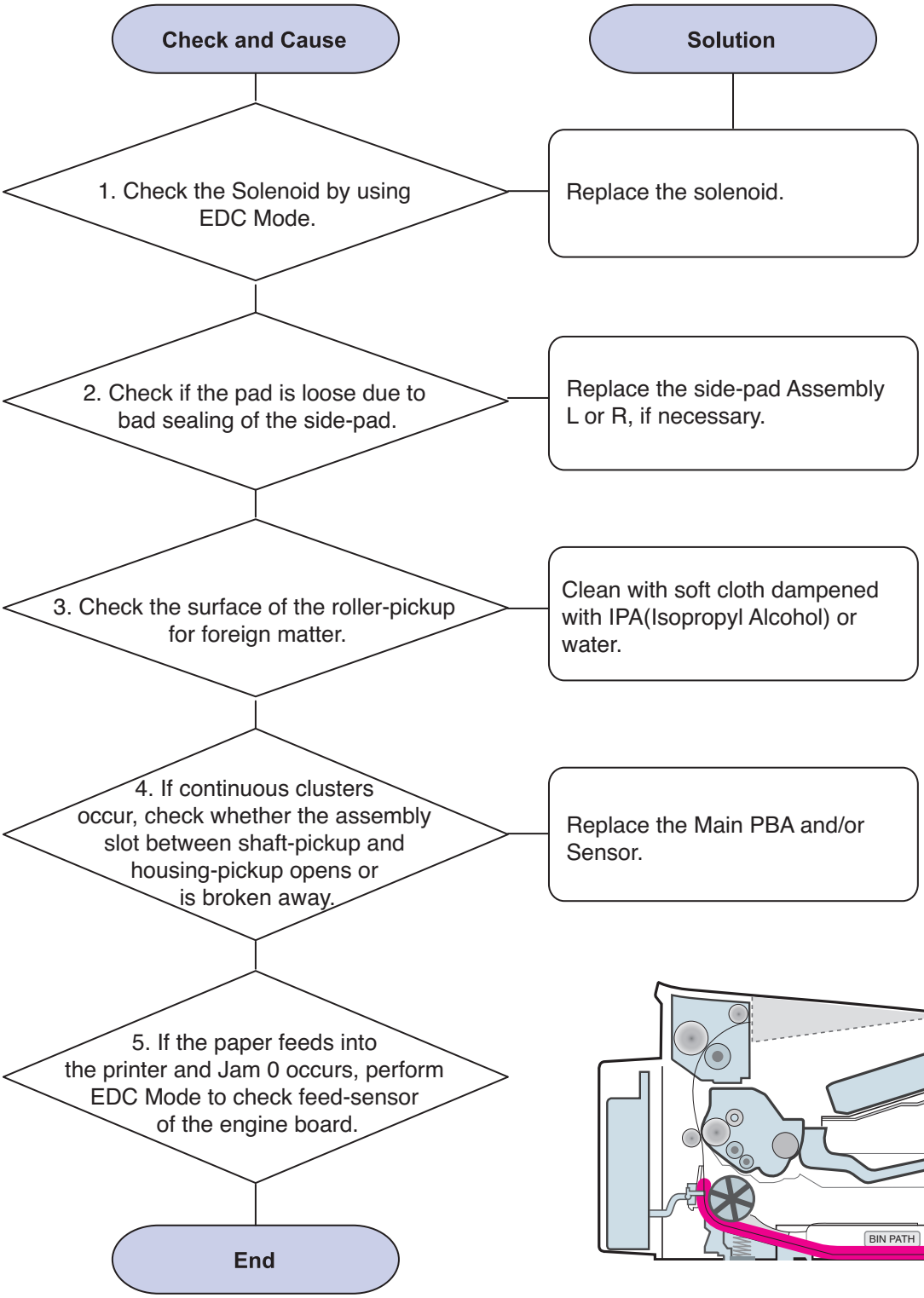
1) Wrong Print Position

Description: Printing begins at wrong position on the paper.



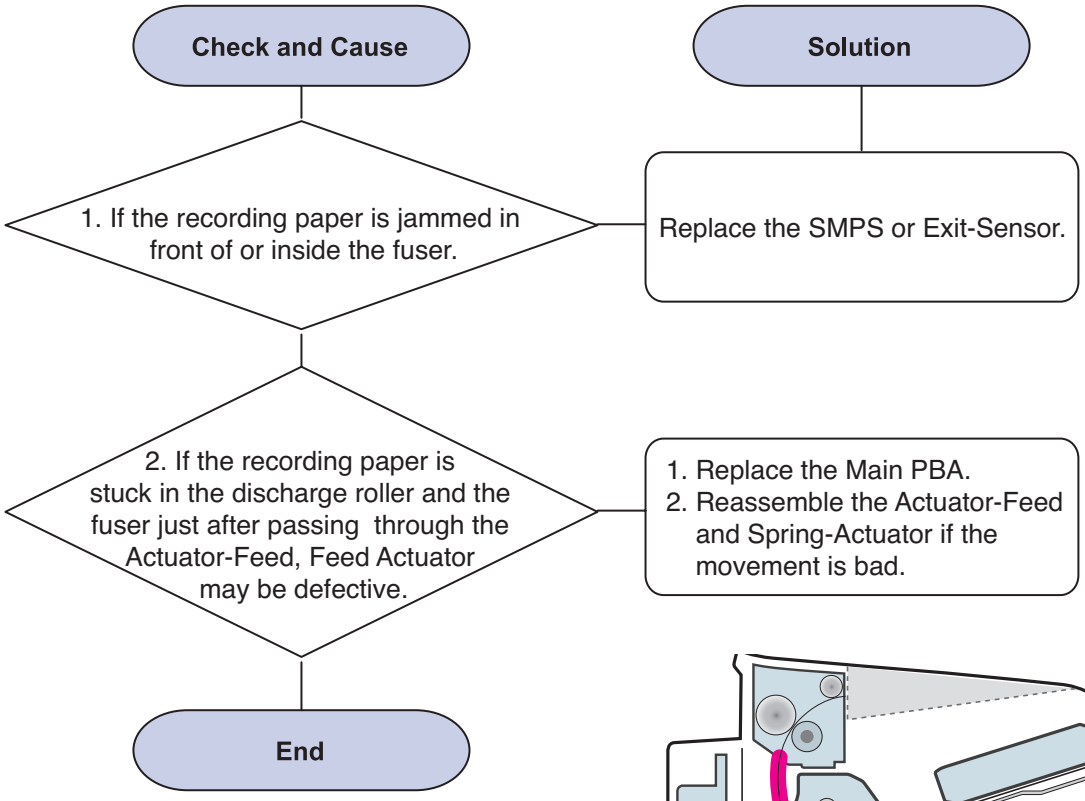
2) JAM 0

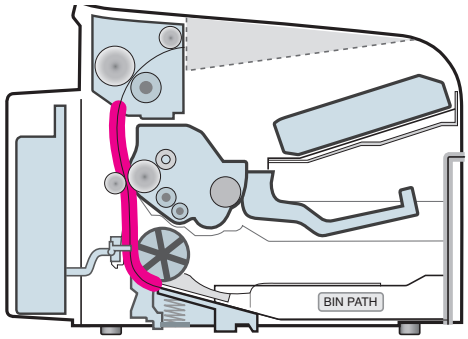
Description: 1. Paper is not exited from the cassette.
2. Jam-0 occurs when the paper feeds into the printer



3) JAM 1

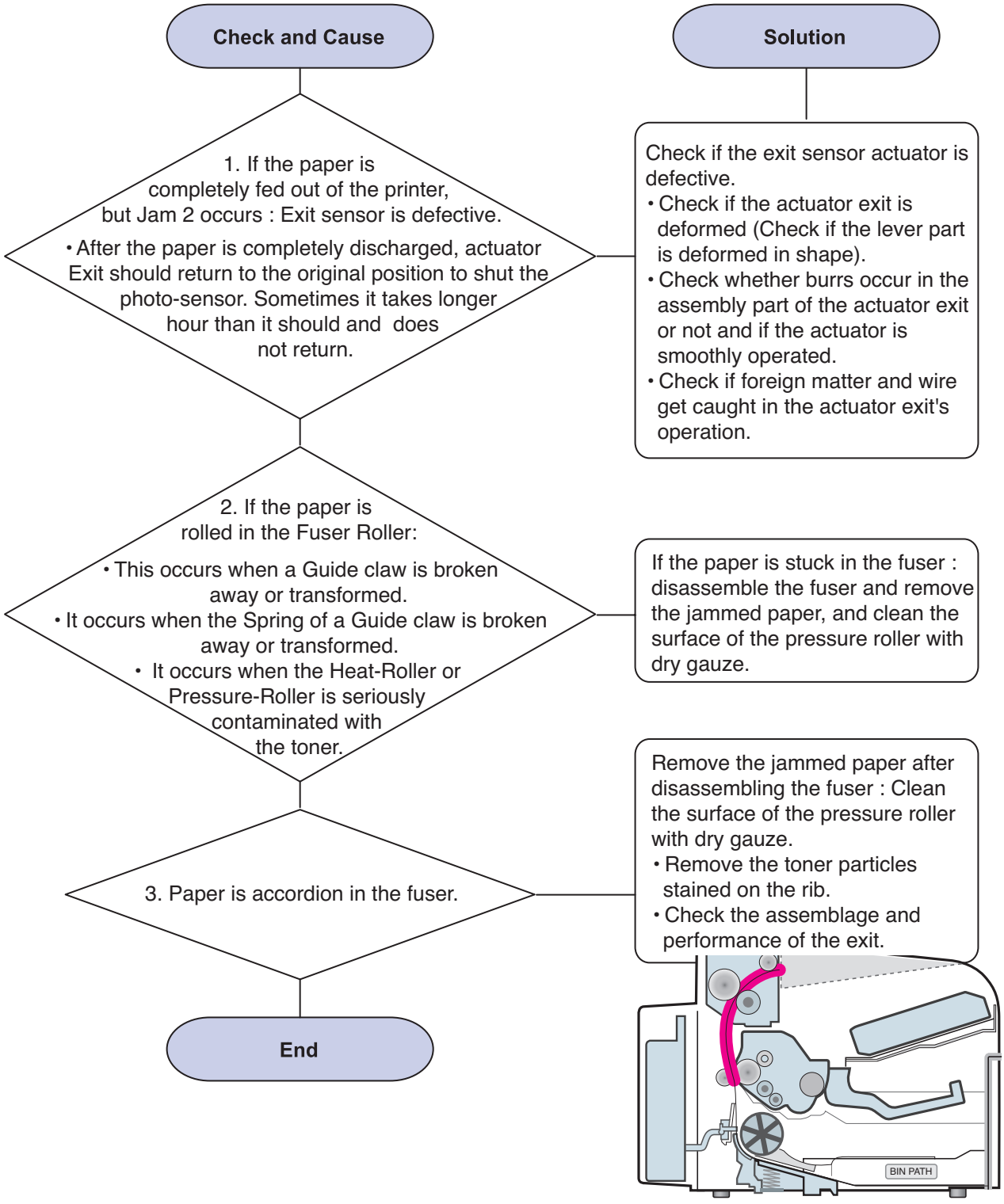
Description: 1. Recording paper is jammed in front of or inside the fuser.
2. Recording paper is stuck in the discharge roller and in the fuser just after passing through the Actuator-Feed.





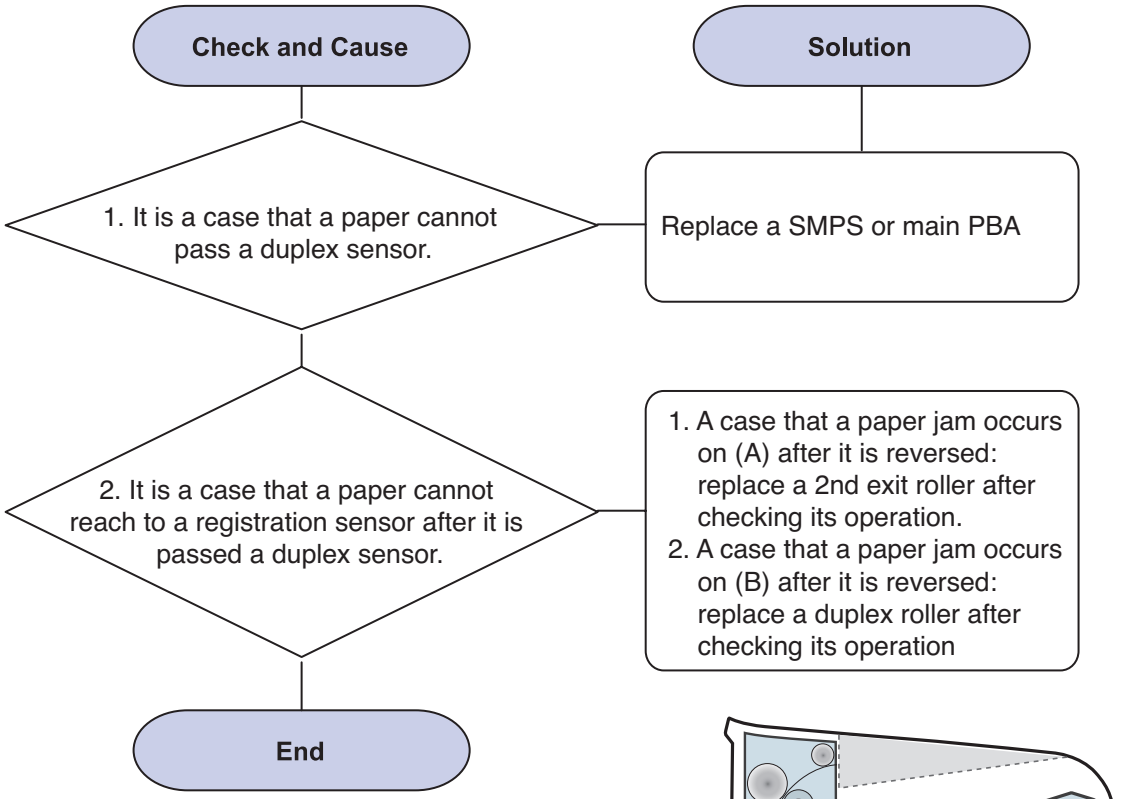
4) JAM 2

Description: 1. Recording paper is jammed in front of or inside the fuser.
2. Recording paper is stuck in the discharge roller and in the fuser just after passing through the Actuator-Feed.



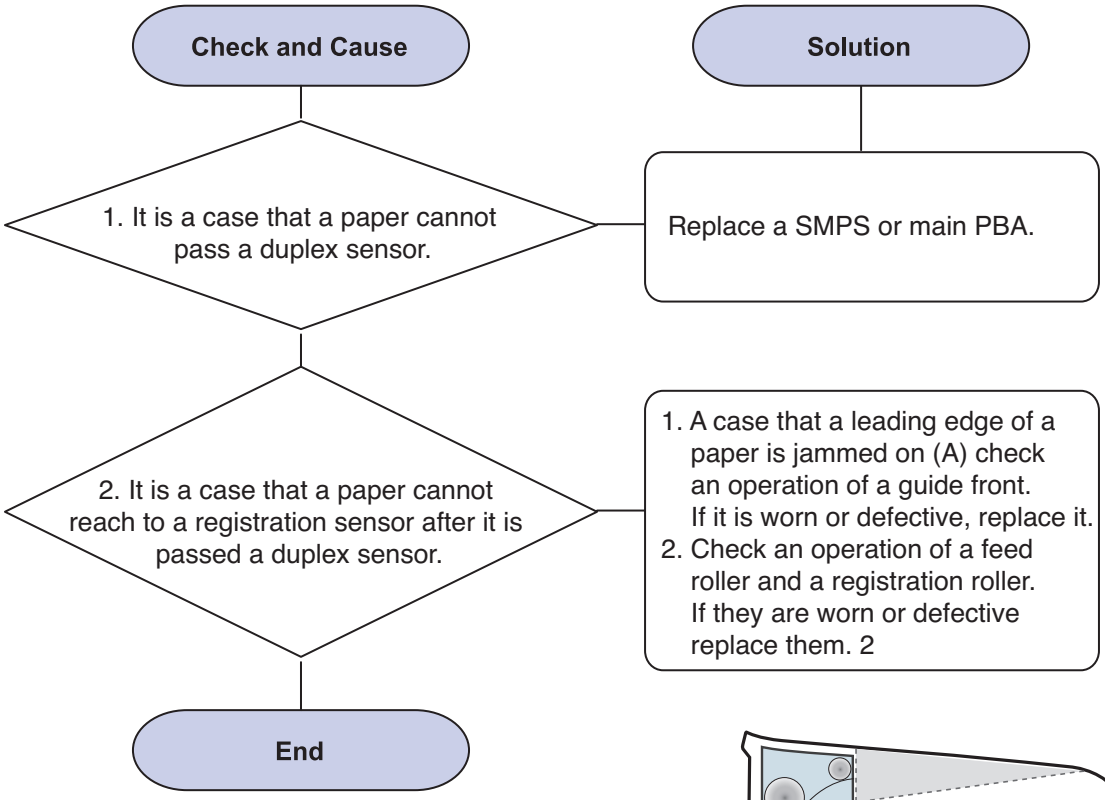
5) JAM Duplex 1

Description: A message 'Jam duplex 1' is displayed in a LCD window.



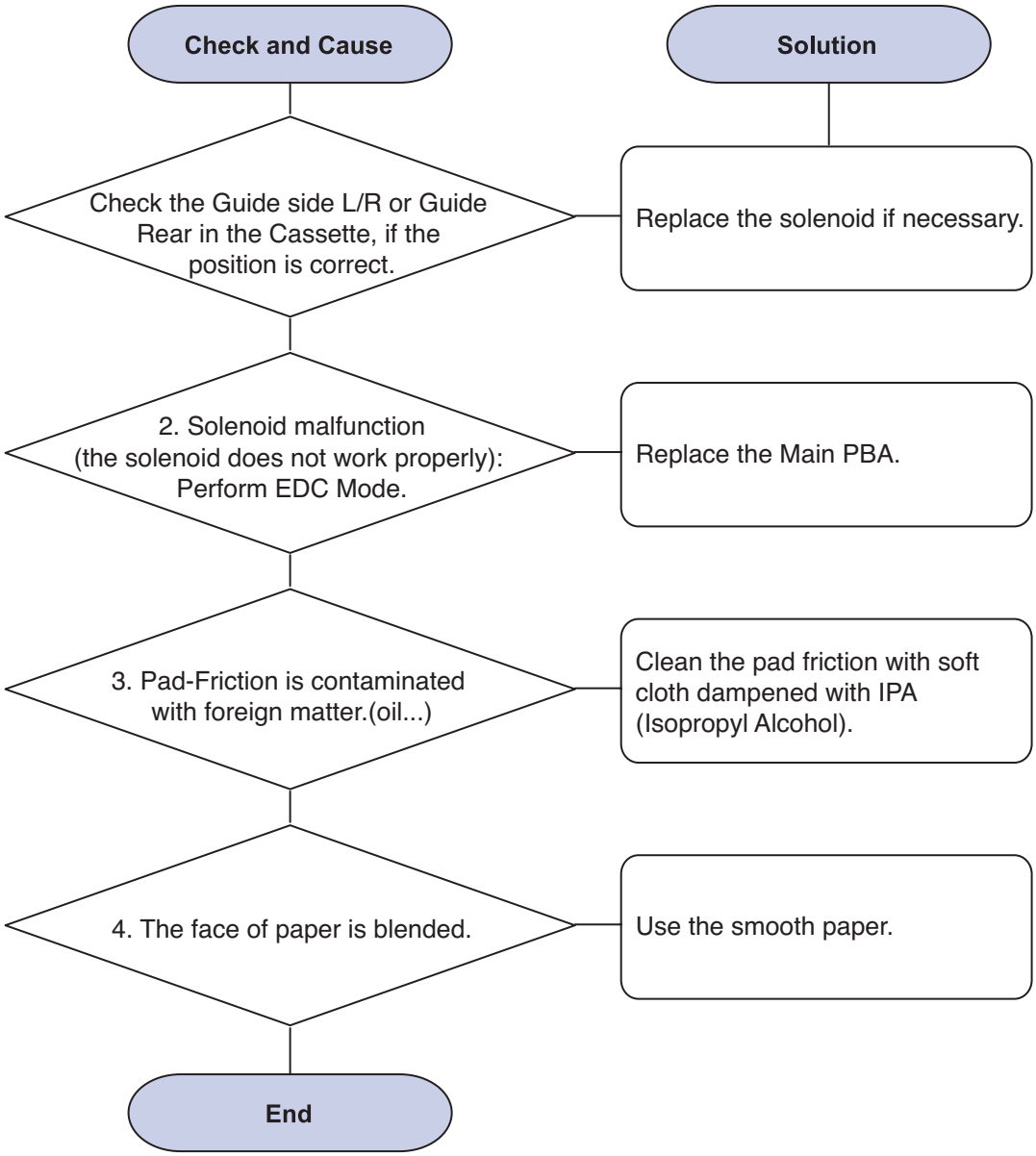
6) JAM Duplex 2

Description: A message 'Jam duplex 2' is displayed in a LCD window.



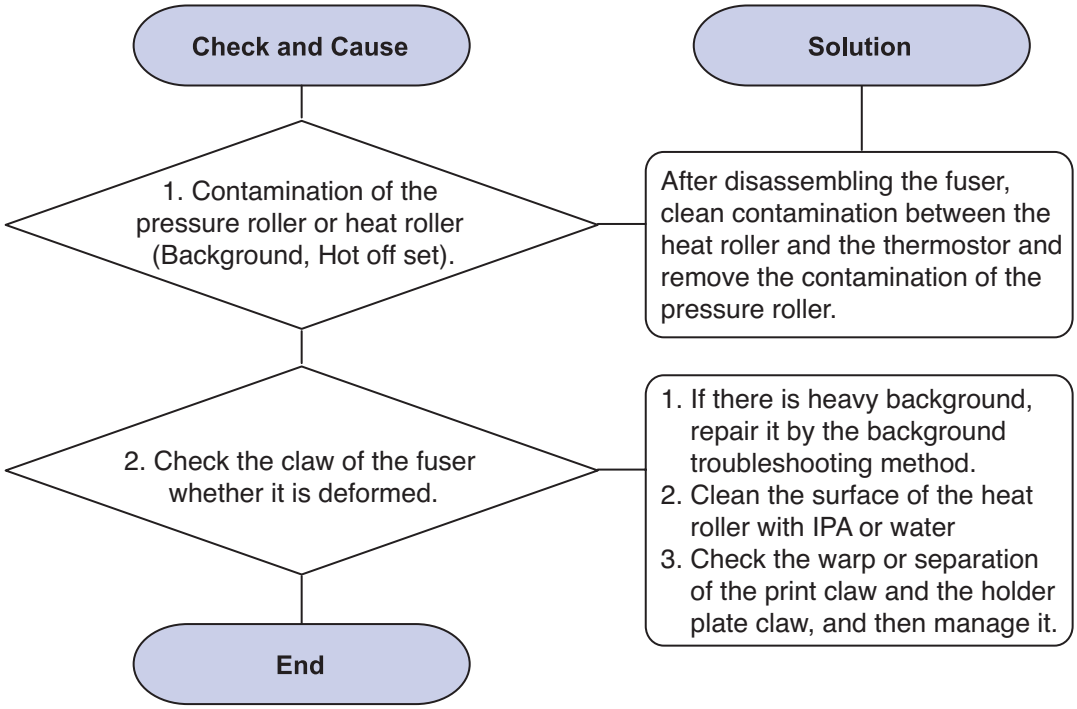
7) Multi-Feeding

Description: Multiple sheets of paper are fed at once.



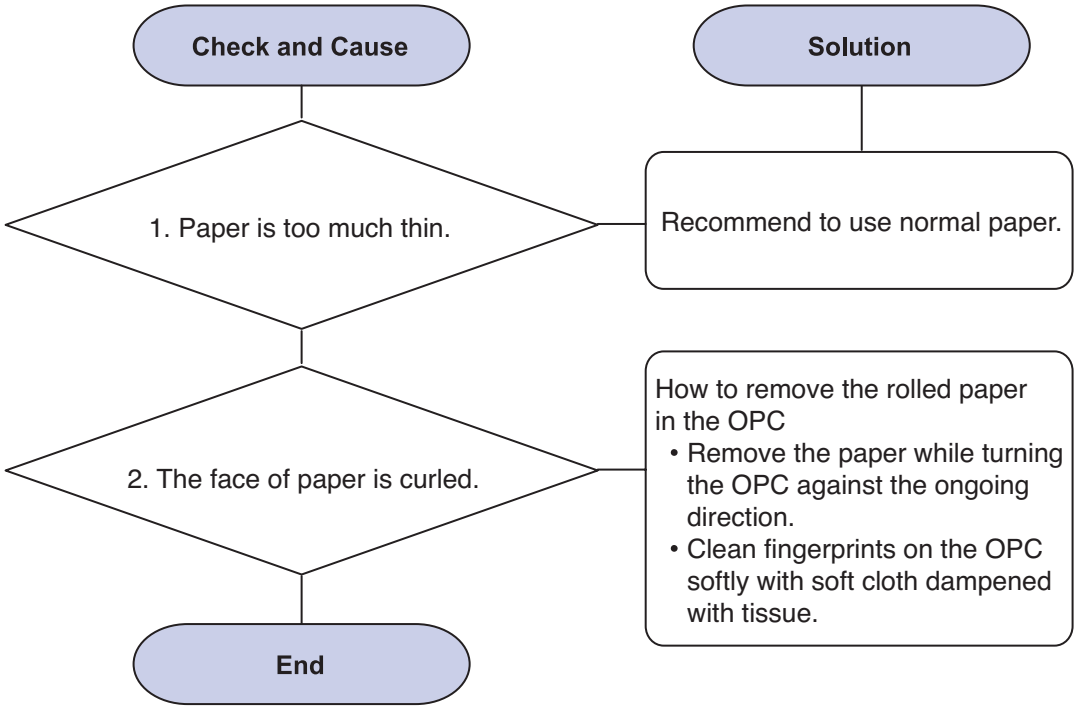
8) Paper rolled in the fuser

Description: If contaminated at intervals of 57mm on the back of a paper.



9) Paper rolled on the OPC Drum

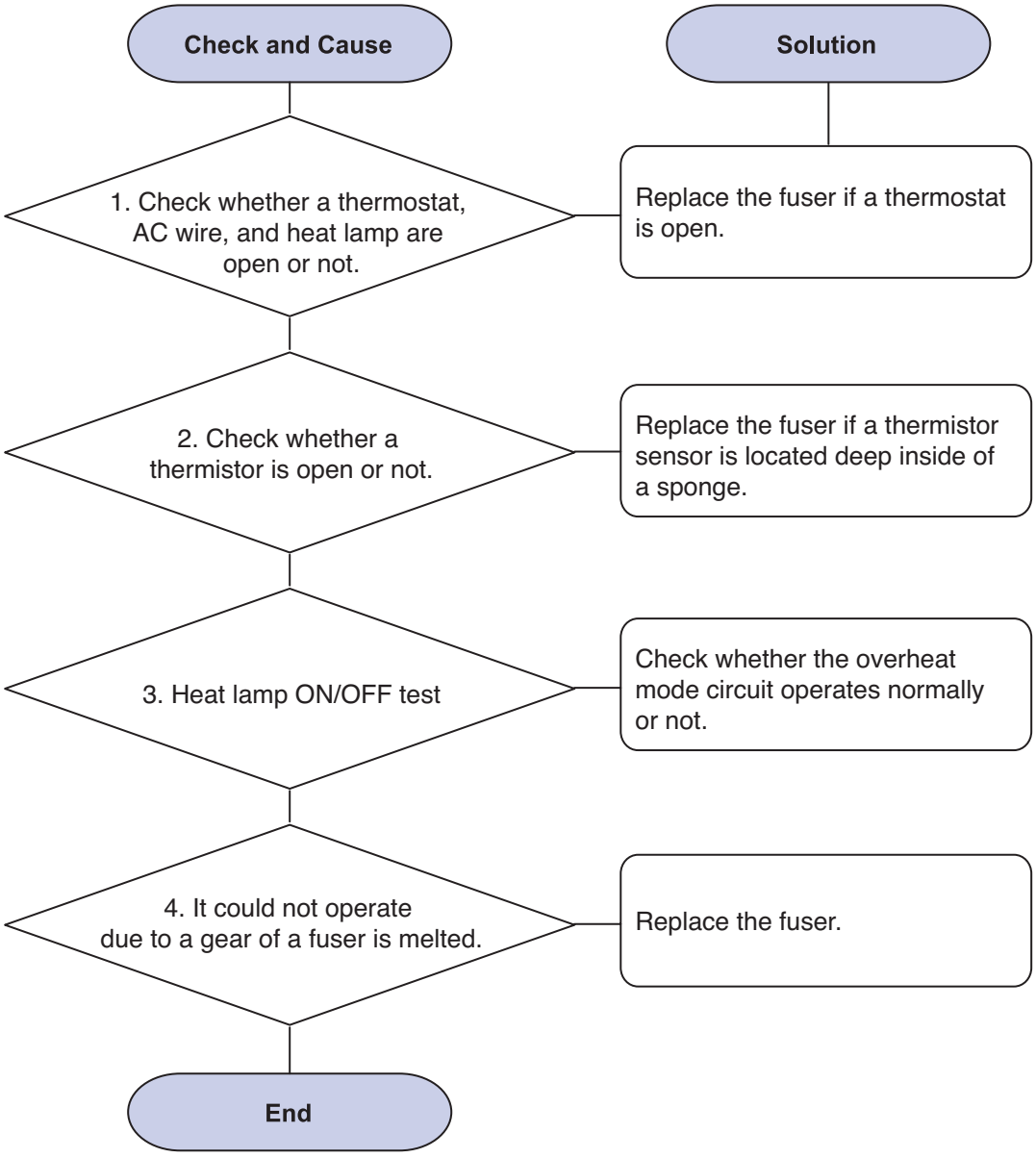
Description: Paper is rolled up in the OPC.



4.2.4 The cause and solution of the malfunction

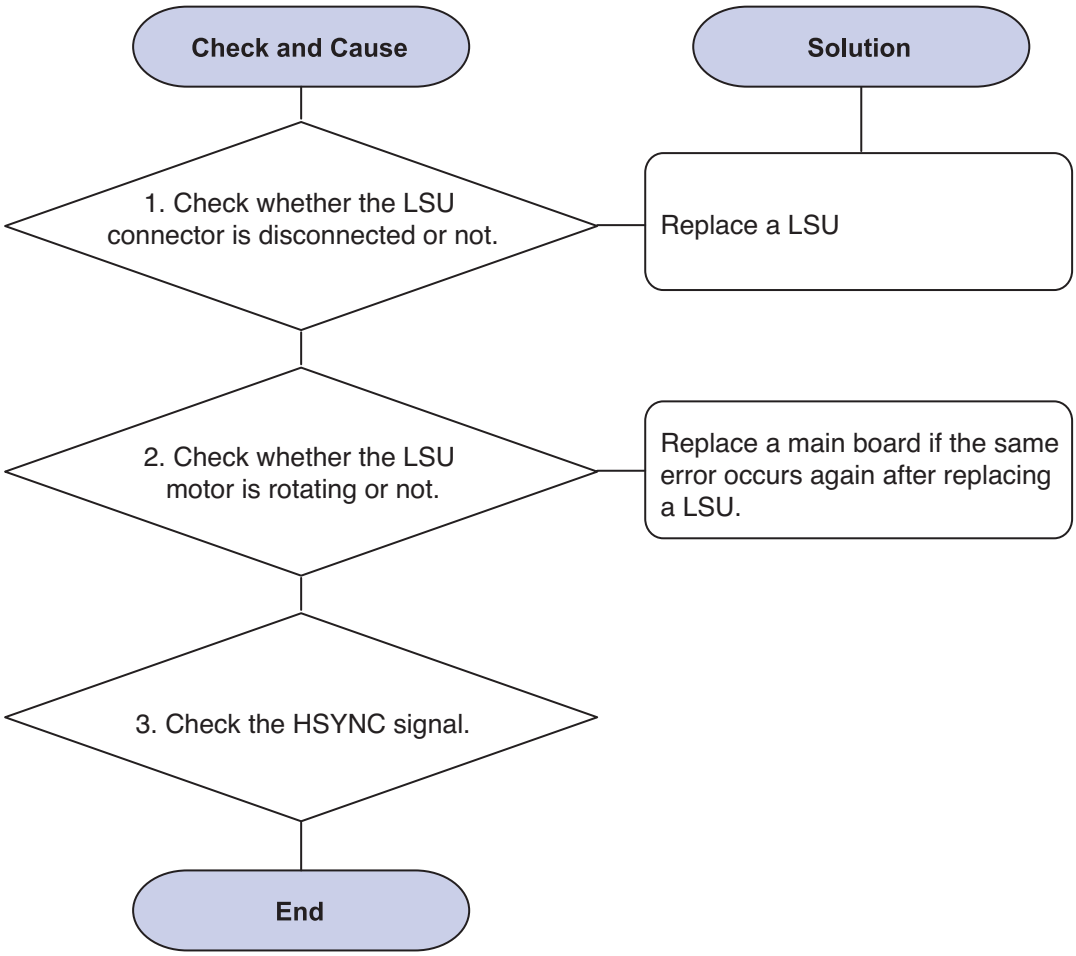
1) Fuser Error

Description: A message "Open fuser/Over heat/Low heat' is displayed in a LCD panel.



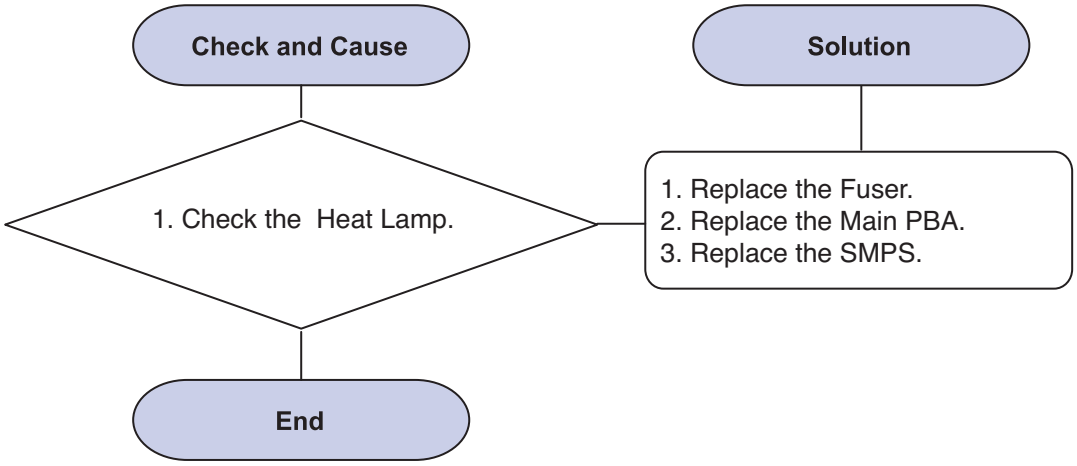
2) LSU Error

Description: A message "PMOTOR ERROR/HSYNC ERROR' is displayed in a LCD panel.



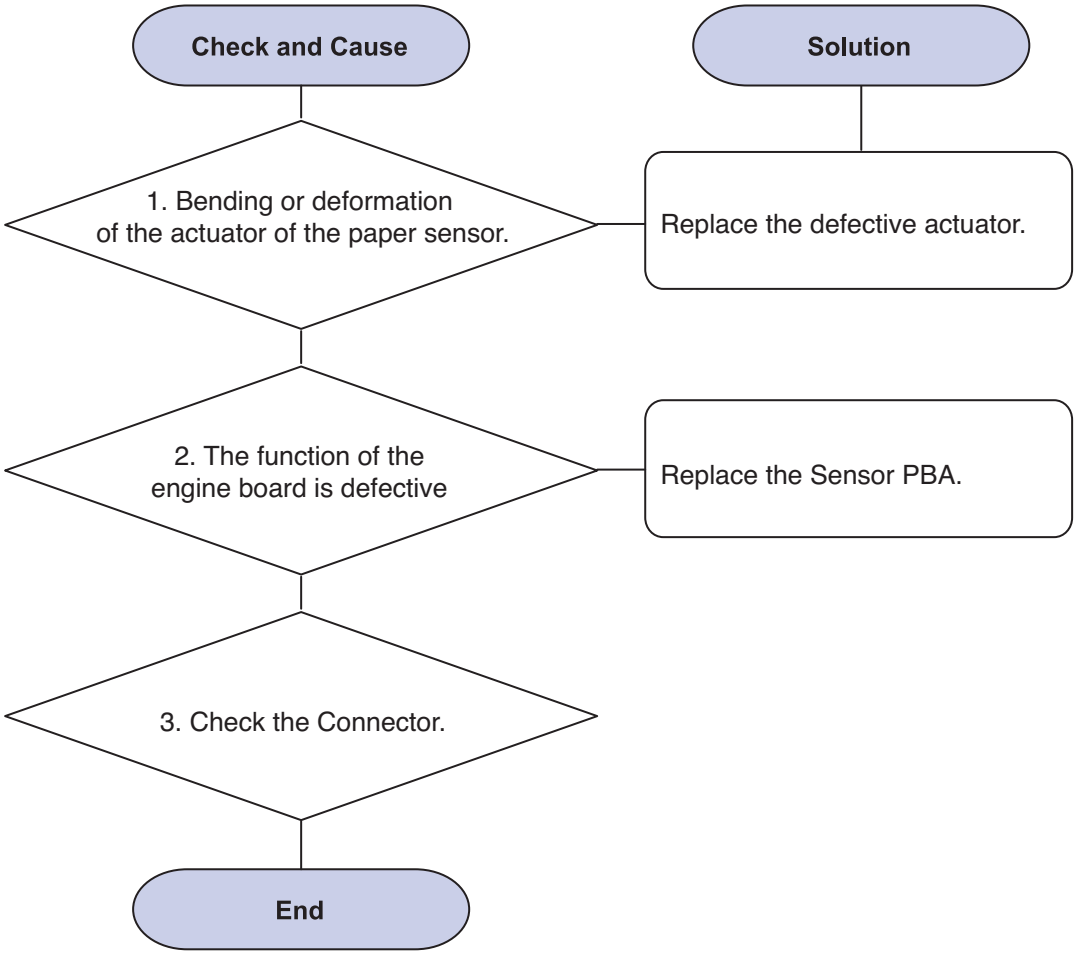
3) Not function of the gear of the fuser due to melting away

Description: The motor breaks away from its place due to gear melting away.



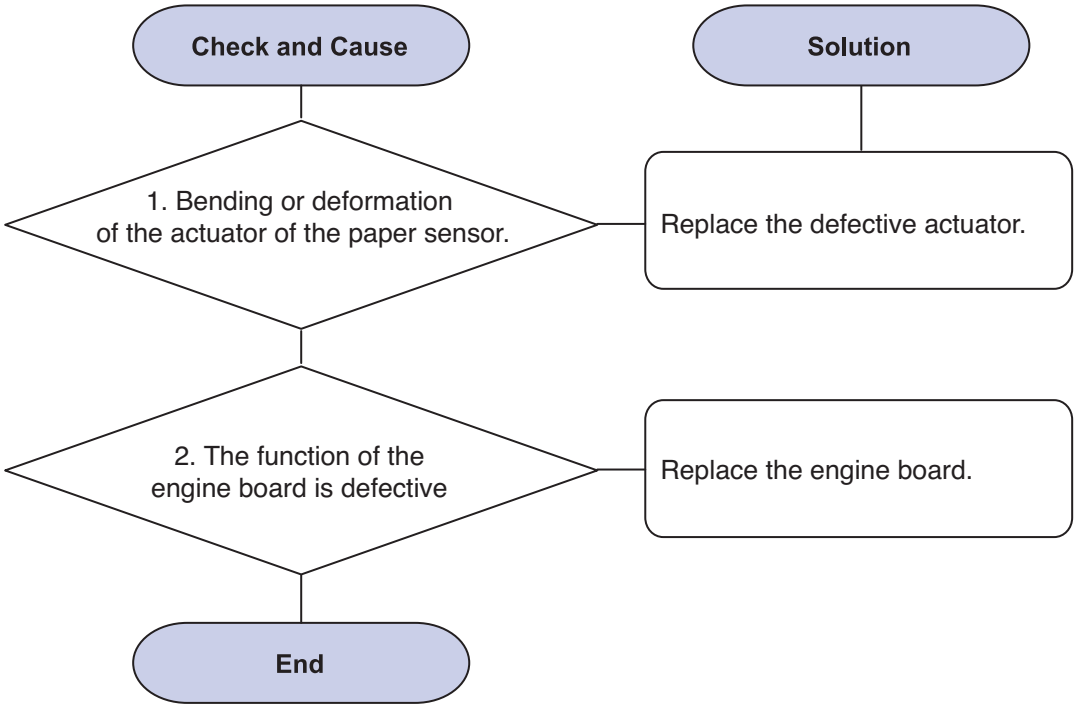
4) Paper Empty

Description: The paper lamp on the operator panel is on even when paper is loaded in the cassette.



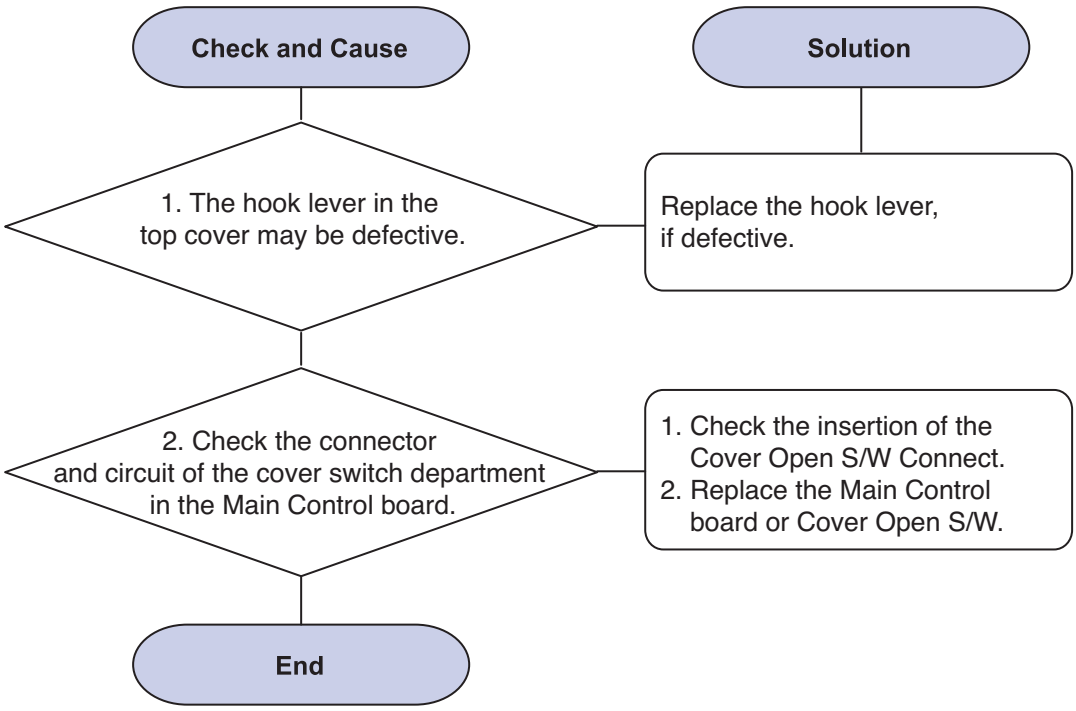
5) Paper Empty without indication

Description: The paper lamp on the operator panel does not come on when the paper cassette is empty.



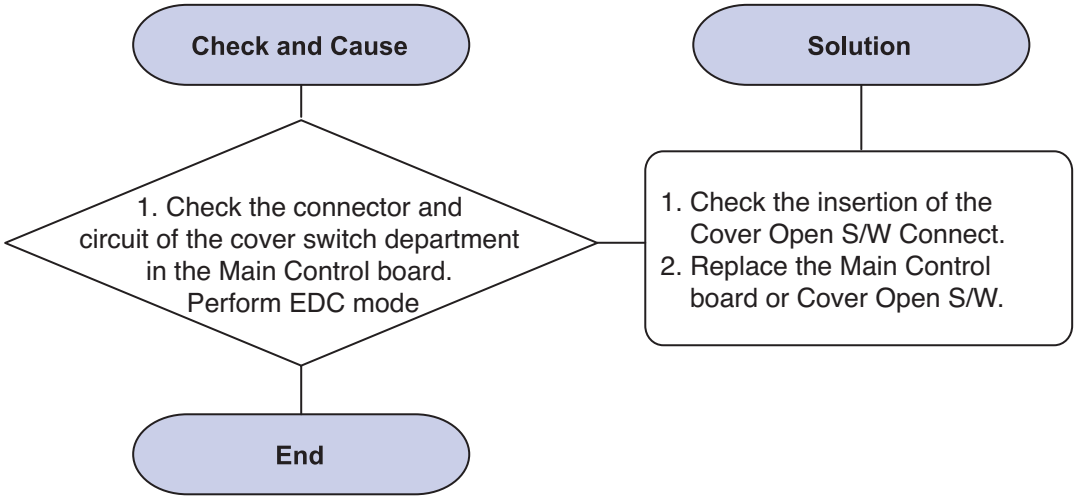
6) Cover Open

Description: The ERROR lamp is on even when the print cover is closed.



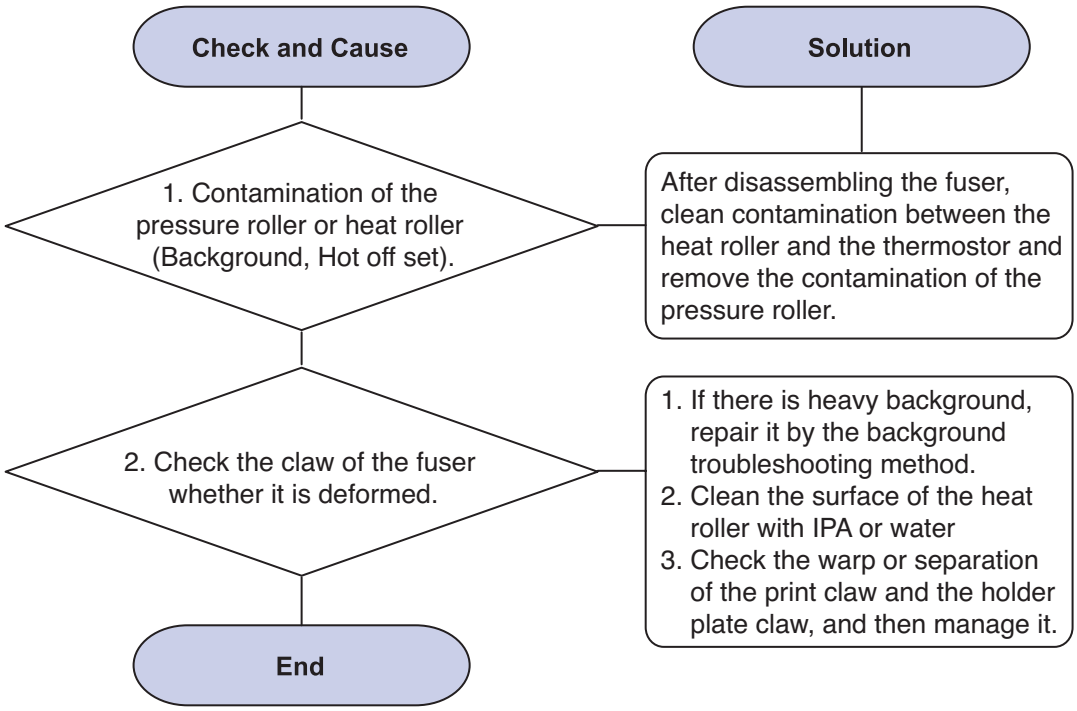
7) No error message when the cover is open

Description: The ERROR message does not come on even when the printer cover is open



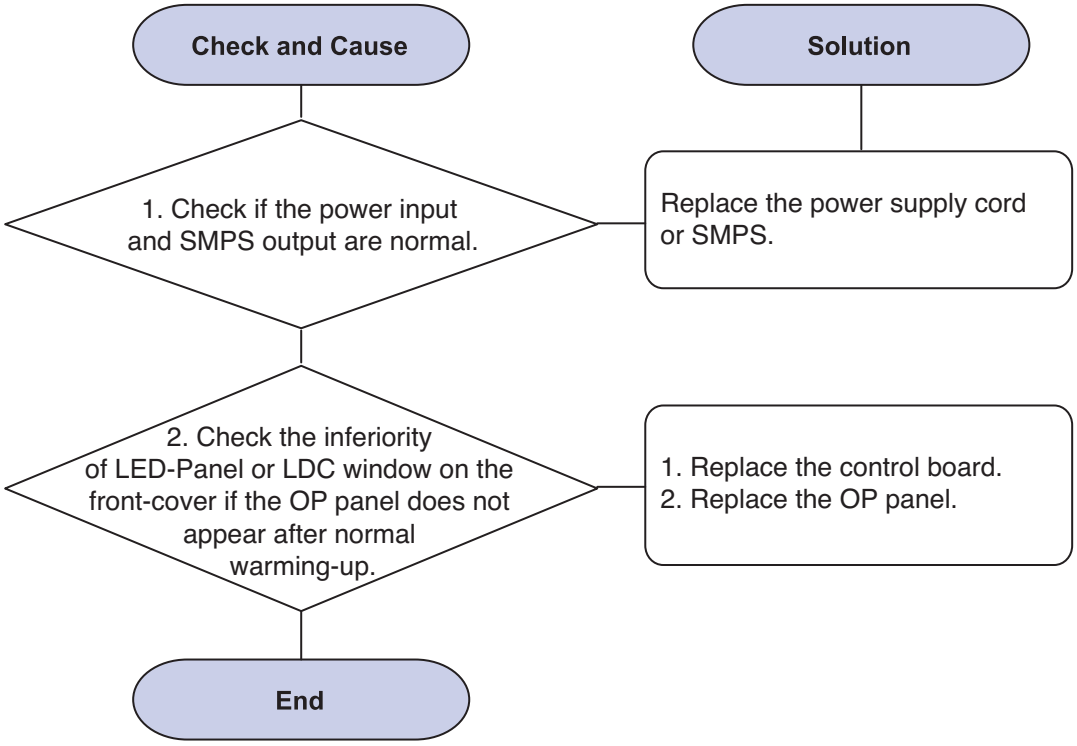
8) Defective motor operation

Description: Main motor is not driving when printing, and paper does not feed into the printer, resulting 'Jam 0'.



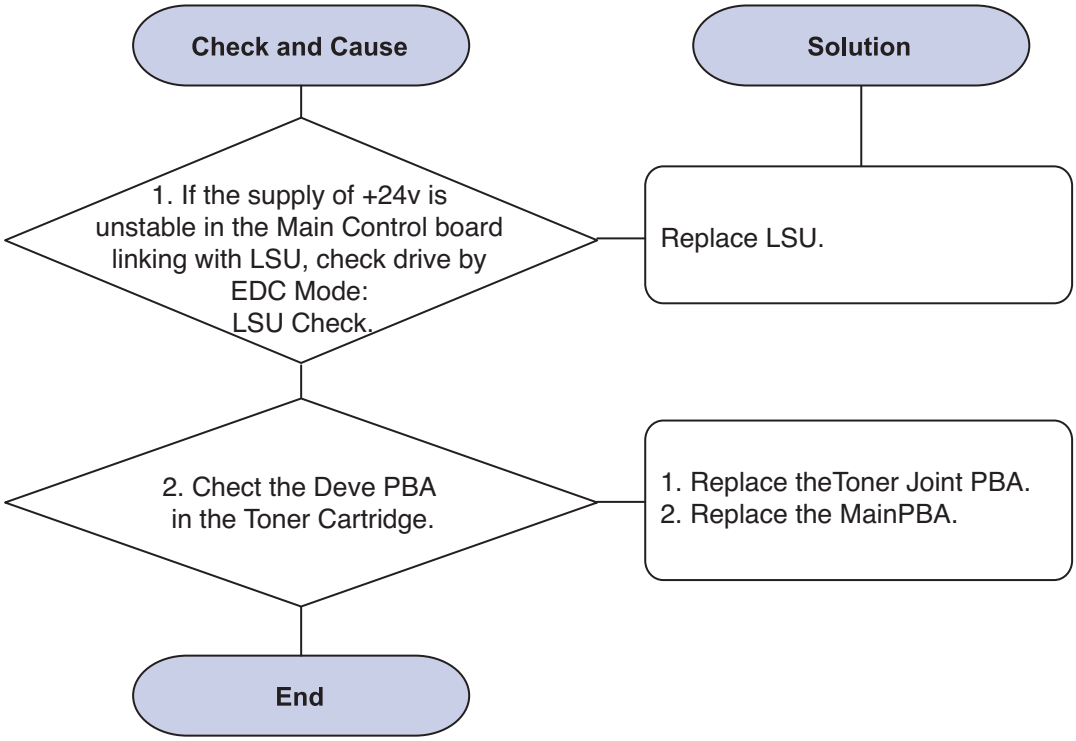
9) No Power

Description: When system power is turned on, all lamps on the operator panel do not come on.



10) Vertical Line Getting Curved

Description: When printing, vertical line gets curved.



4.2.5 Toner Cartridge Service

It is not guaranteed for the default caused by using other toner cartridge other than the cartridge supplied by the Samsung Electronic or caused by non-licensed refill production.

4.2.5.1 Precautions on Safe-keeping of Toner Cartridge

Excessive exposure to direct light more than a few minutes may cause damage to the cartridge.

4.2.5.2 Service for the Life of Toner Cartridge

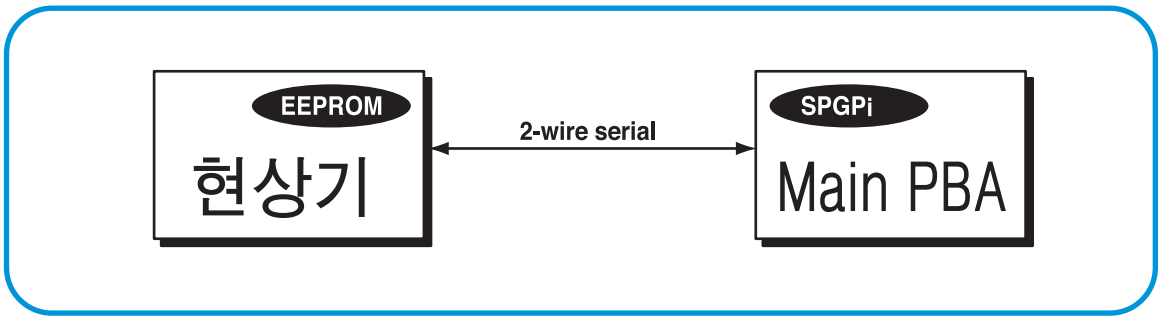
If the printed image is light due to the life of the toner, you can temporarily improve the print quality by redistributing the toner(Shake the toner cartridge), however, you should replace the toner cartridge to solve the problem thoroughly.

4.2.5.3 Distinguish function for choice cartridge

• Distinguish function for choice cartridge

An EEP ROM is mounted to a cartridge for distinguishing a choice toner cartridge. Items written in below are detected by checking up memory information.
If the data of the EEP ROM is broken, it cannot be detected.

1) Detecting existence of a toner cartridge: It detects whether a toner cartridge is mounted or not.
2) Detecting a serial number of a toner cartridge.
3) Detecting a toner cartridge supplying company: If it is not Samsung's, it is not operated.
4) Detecting an OPC rotating counter: It detects the life span of an OPC drum.



• Distinguish a refilled cartridge. (with eyes)

1) Check whether One-way screw is damaged or not
2) Check the cartridge on configuration sheet(Print out the self-test configuration)
: Manufacture date and serial number of toner cartridge are different(permissible range : +/- 1).

4.2.5.4 Error message (LCD window) related in a toner sensor

It explains a message related in toner sensor in a LCD.

4.2.5.4(a) Invalid Toner

- Contents: It is displayed when a supplier is different between a toner cartridge and a set. If this message is shown up, a printing process cannot operate.
- Solution: Attach a suitable toner cartridge (the same supplier's) to a set. (A unique key has been applied.)

4.2.5.4(b) Low Toner

- Contents: This message shows up when a message "remaining toner: 10%" is displayed in a cartridge count information.
- Solution: It means that a toner in the toner cartridge has been almost ended. Repare the new toner cartridge.

4.2.5.4(c) Replace Cartridge

- Contents: It means the life span of a toner cartridge (except a toner part) has been ended. Even though a case that a toner is refilled, the rest of major parts have been ended, so entire toner cartridge might be replaced.
- Solution: If an Toner Cartridge Life cycle Probreum, in a worst case, a toner overflows and it may cause a system fail. Therefore, recommend a user to replace a toner cartridge.

4.2.5.5 Signs and Measures at Poor toner cartridge

Fault	Signs	Cause & Check	Solution
Light image and partially blank image (The life is ended.) Digital Printer Digital Printer Digital Printer Digital Printer Digital Printer	• The printed image is light or unclean and untidy. • Some part of the image is not printed. • Periodically a noise as "tick tick" occurs.	1. If the image is light or unclean and untidy printed image - Shake the toner cartridge and then recheck. (1)NG: Check the weight of the toner cartridge (2)OK: Lack of toner, so the life is nearly closed. 2. Some part of image is not printed - Shake the toner cartridge and then recheck. (1)NG: Check the weight of the toner cartridge and clean the LSU window with a cotton swab, then recheck. (2)OK: Lack of toner, so the life is nearly closed. 3. Periodically a noise as "tick tick" occurs - Measure the cycle and the weight of the toner cartridge. 4. White vertical stripes on the whole screen or partly : Check the weight of the toner cartridge.	1. All of 1, 2, 3 above- If it become better by shaking, replace with a new toner cartridge after 50-100 sheets in the closing state of the life span. 2. In case of 2- If it becomes better after cleaning the LSU window, then the toner cartridge is normal. (Because of foreign substance on the LSU window, the image has not been printed partly.) 3. In case of 3- If the cycle of noise is about 2 seconds, the toner inside the toner cartridge has been nearly exhausted.(Purchase and replace with a new toner cartridge after using about 200 sheets at the point of occurrence) 4. In case of 3- This is a phenomenon caused by lack of toner, so replace with a new toner cartridge.
Toner Contamination	• Toner is fallen on the papers periodically. • Contaminated with toner on prints partly or over the whole surface.	1. Toner is fallen on the paper periodically. (1)Check the cycle of the falling of the toner. (2)Check the appearance of both ends of the toner cartridge OPC drum. 2.The center of the printed matter is contaminated with toner. (1)Check whether foreign substances or toner are stuck to the terminal (contact point) of the toner cartridge. (2)Check whether the state of the terminal assembly is normal.	1. If both ends of the OPC drum are contaminated with toner: Check the life of the toner cartridge. 2. Check whether it could be recycled. 3. If it cannot be recycled: Replace the toner cartridge.

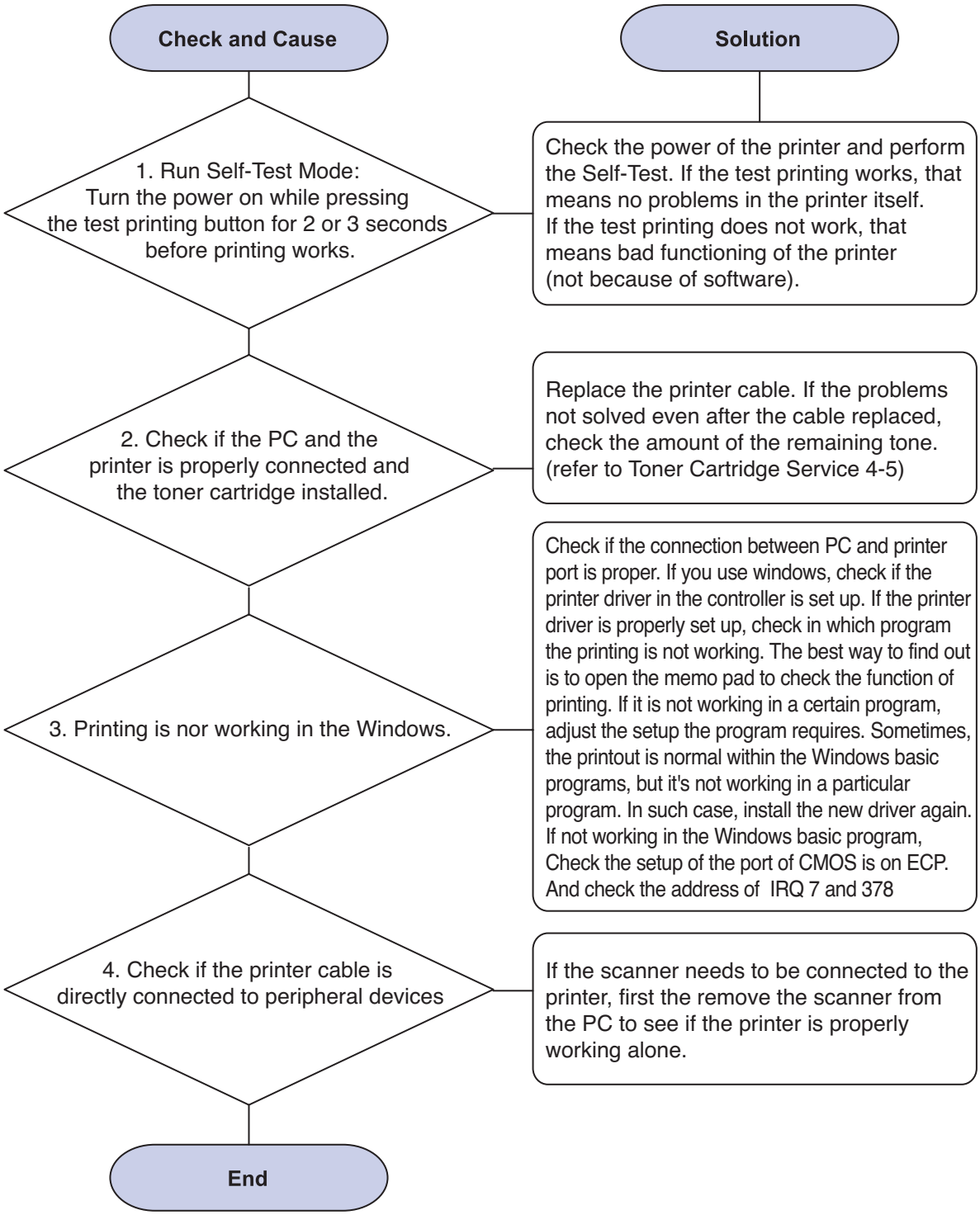
Fault	Signs	Cause & Check	Solution
White Black spot  	• Light or dark black dots on the image occur periodically. • White spots occur in the image periodically.	1. If light or dark periodical black dots occur, this is because the toner cartridge rollers are contaminated with foreign substance or paper particles. (1)38mm interval : Charged roller (2)95mm interval : OPC cycle 2. If white spots occur in a black image at intervals of 95mm, or black spots occur elsewhere, the OPC drum is damaged or foreign substance is stuck to the surface. 3. If a black and white or graphic image is partially broken at irregular intervals, the transfer roller's life has been expired or the transfer voltage is abnormal.	1. In case of 1 above - Run OPC Cleaning Mode Print 4-5 times repeatedly to remove. Especially check foreign substance on the OPC surface, then remove them with a clean gauze moistened with IPA(Isopropyl Alcohol) not to damage OPC if necessary. **⚠Never use usual alcohol.** 2. In case of 2 If they are not disappeared by running OPC Cleaning Mode Print 4-5 times. : at intervals of 38mm - Replace the toner cartridge. : at intervals of 95mm - Remove foreign substance. : Broken image - Replace the toner cartridge according to carelessness. 3. In case of 3 - Exchange the transfer roller because the life of the transfer roller in use has been expired. (Check the transfer voltage and readjust if different.)
Recycled product	• Poor appearance of the toner cartridge. • Unclean and rough printouts. • Bad background in the image.	1. Poor appearance of the toner cartridge. (1)Check the damage to label and whether different materials are used. (2)Check the appearance of parts of the toner cartridge, such as frame, hopper. 2. Unclean and rough printouts. (1)Check whether foreign substance or toner are stuck to the terminal (contact point) of the toner cartridge. (2)Check whether the state of the terminal assembly is normal.	1. In case of 1 - (1)If there is an evidence of disassembling the toner cartridge. (2)If materials other than normal parts of the toner cartridge are added or substituted. 2. In case of 2 - If there are any abnormals in connection with the situation of 1. (1)It occurs when the toner cartridge is recycled over 2 times. (2)If toner nearly being expired are collected to use, it is judged as the recycled toner cartridge.

Fault	Signs	Cause & Check	Solution
Ghost & Image Contamination	• The printed image is too light or dark, or partially contaminated black. • Totally contaminatedblack. (Black image printed out) • The density of printouts is too dark and ghost occurs.	1. The printed image is too light or dark, or partially contaminated black. (1)Check whether foreign substance or toner are stuck to the terminal(point of contact) of the toner cartridge. (2)Check whether the terminal assembly is normal. 2. Totally contaminated black. (Black image printed out) (1)Check whether foreign substances are stuck to the terminal(point of contact) of the toner cartridge and the state of assembly. (Especially check the charged roller terminal.) 3. The printed image is dark and ghost occurs. (1)Check foreign substance attached to the terminal (point of contact) of the toner cartridge and the state of assembly. (Especially check the developing roller terminal.)	1. All of 1, 2, 3 above (1)Remove toner and foreign substances adhered to the contact point of the toner cartridge. (2)The contact point of the unit facing that of the toner cartridge also must be cleaned. (3)If the terminal assembly is unsafe: • Fully stick the terminal to or reassemble it after disassembling. • Disassemble the side plate and push the terminal to be stuck, then reassemble it. 2. In case of 2 It is a phenomenon when the OPC drum of the toner cartridge is not electrically charged. Clean the terminals of the charged roller, then recheck it. 3. In case of 3 It is a phenomenon as the developing bias voltage of the toner cartridge. Clean the terminals of the developing roller, then recheck it.

4.2.6 The cause and solutions of bad environment of the software

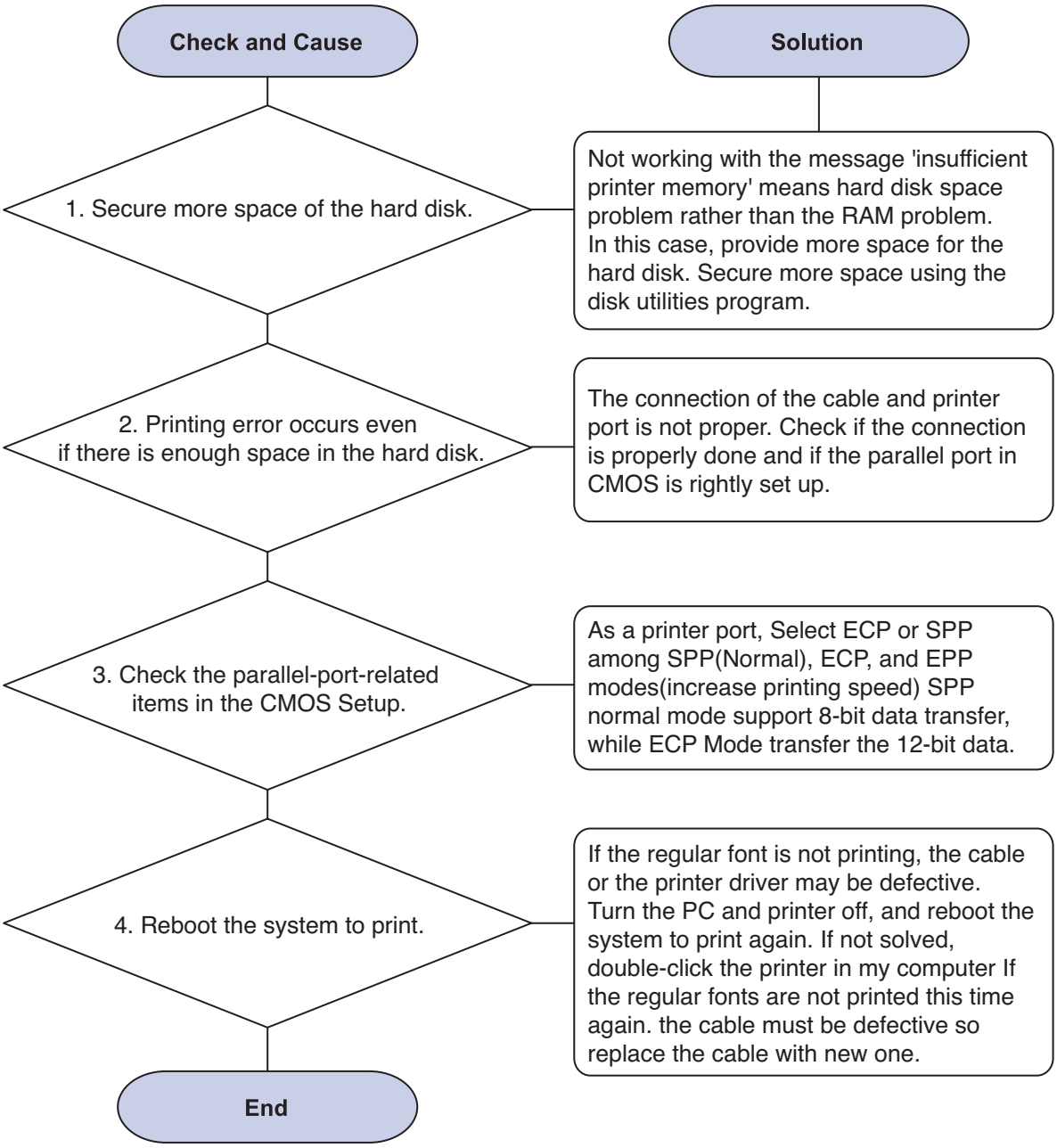
1) The printer is not working (1)

Description: While Power turned on, the printer is not working in the printing mode.



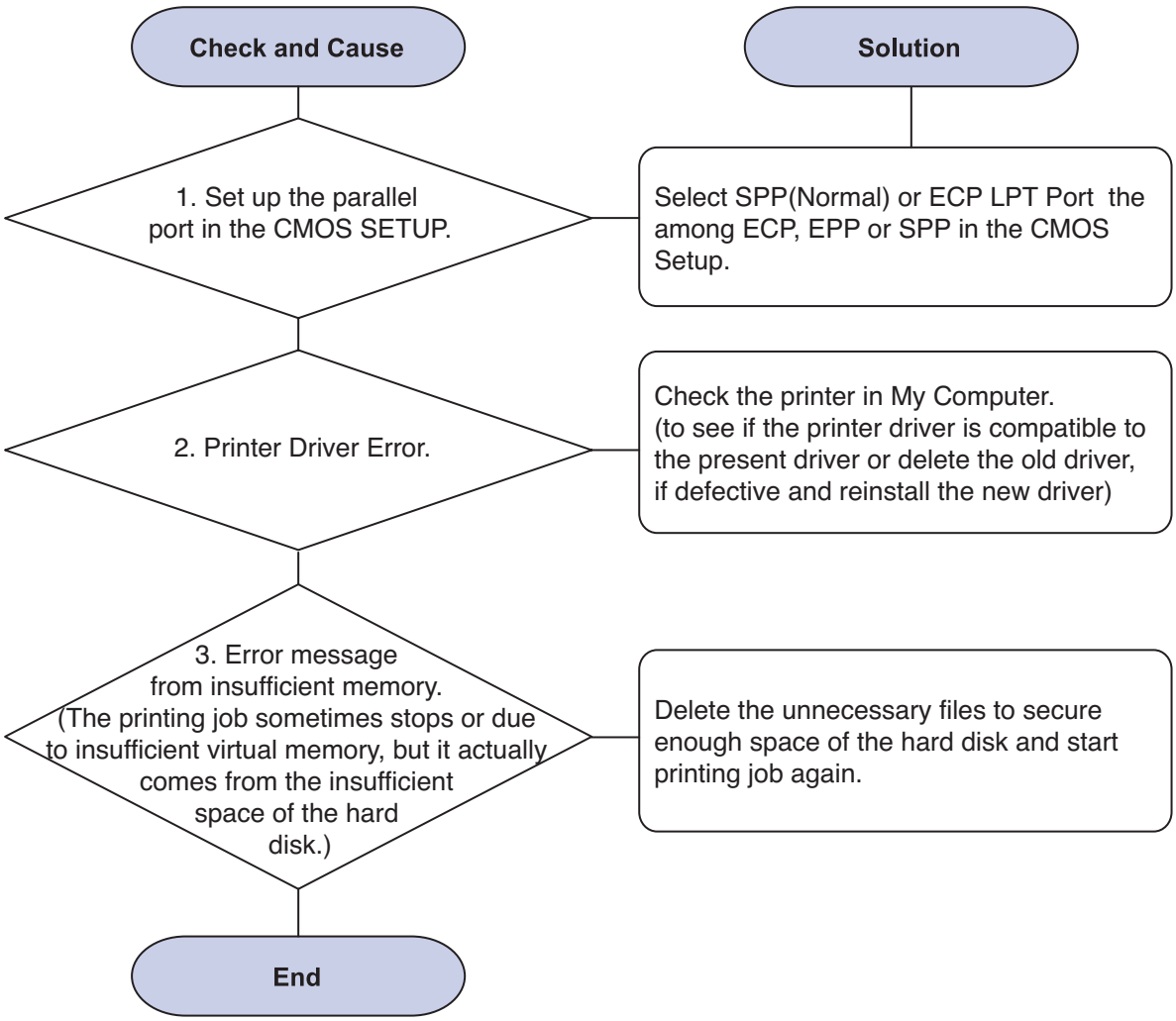
2) The printer is not working (2)

Description: After receiving the printing order, no response at all or the low speed of printing occurs due to wrong setup of the environment rather than malfunction of the printer itself.



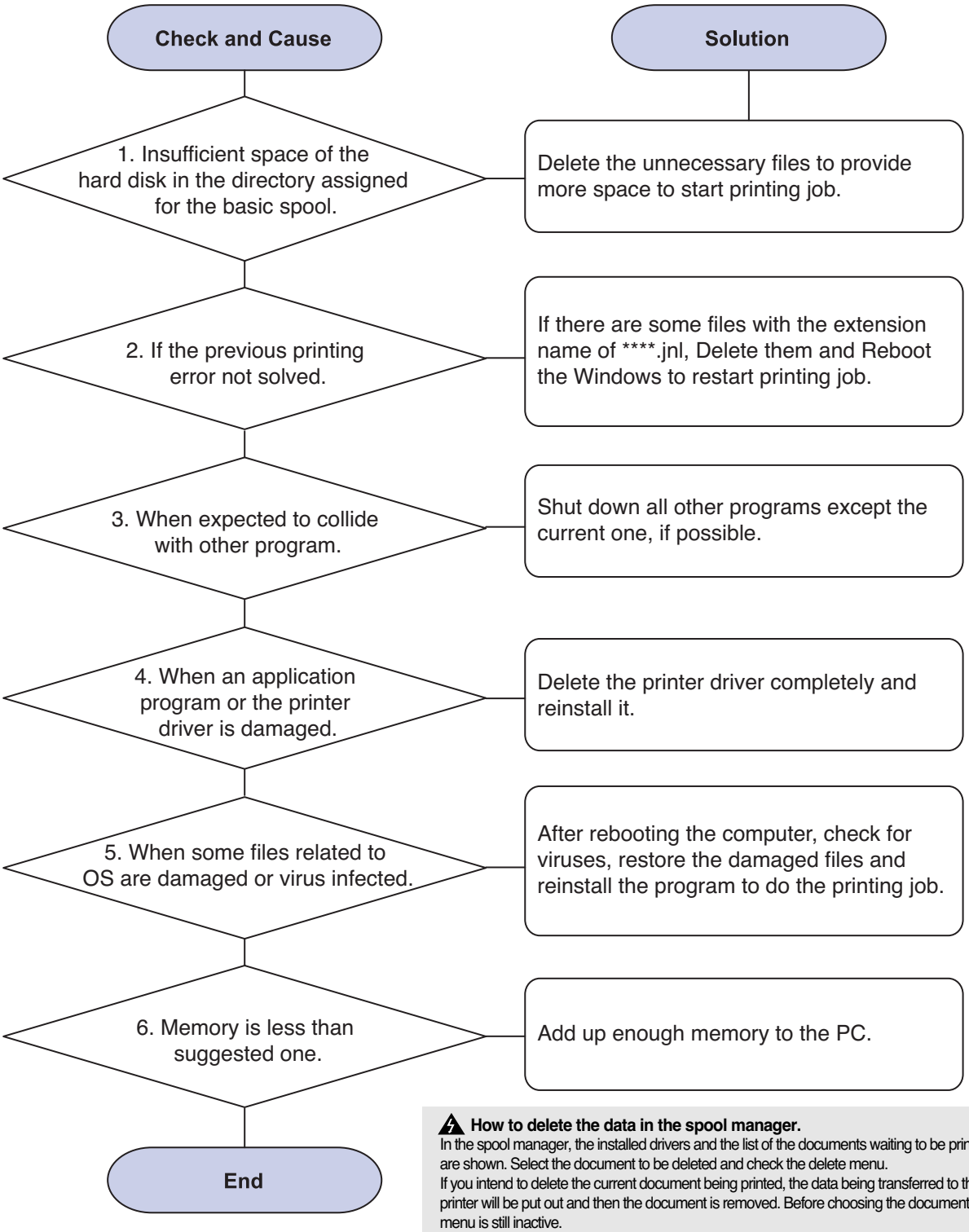
3) Abnormal Printing

Description: The printing is not working properly even when the cable has no problem.
(even after the cable is replaced)
If the printer won't work at all or the strange fonts are repeated, the printer driver may be defective or wrong setup in the CMOS Setup.



4) SPOOL Error

Description: To spool which stands for "simultaneous peripheral operations online" a computer document or task list (or "job") is to read it in and store it, usually on a hard disk or larger storage medium so that it can be printed or otherwise processed at a more convenient time (for example, when a printer is finished printing its current document).



How to delete the data in the spool manager.
In the spool manager, the installed drivers and the list of the documents waiting to be printed are shown. Select the document to be deleted and check the delete menu.
If you intend to delete the current document being printed, the data being transferred to the printer will be put out and then the document is removed. Before choosing the document, the menu is still inactive.
Or put the document out of the list and repeat the routine as in the above or finish the spool manager.

5. Exploded Views and Parts List

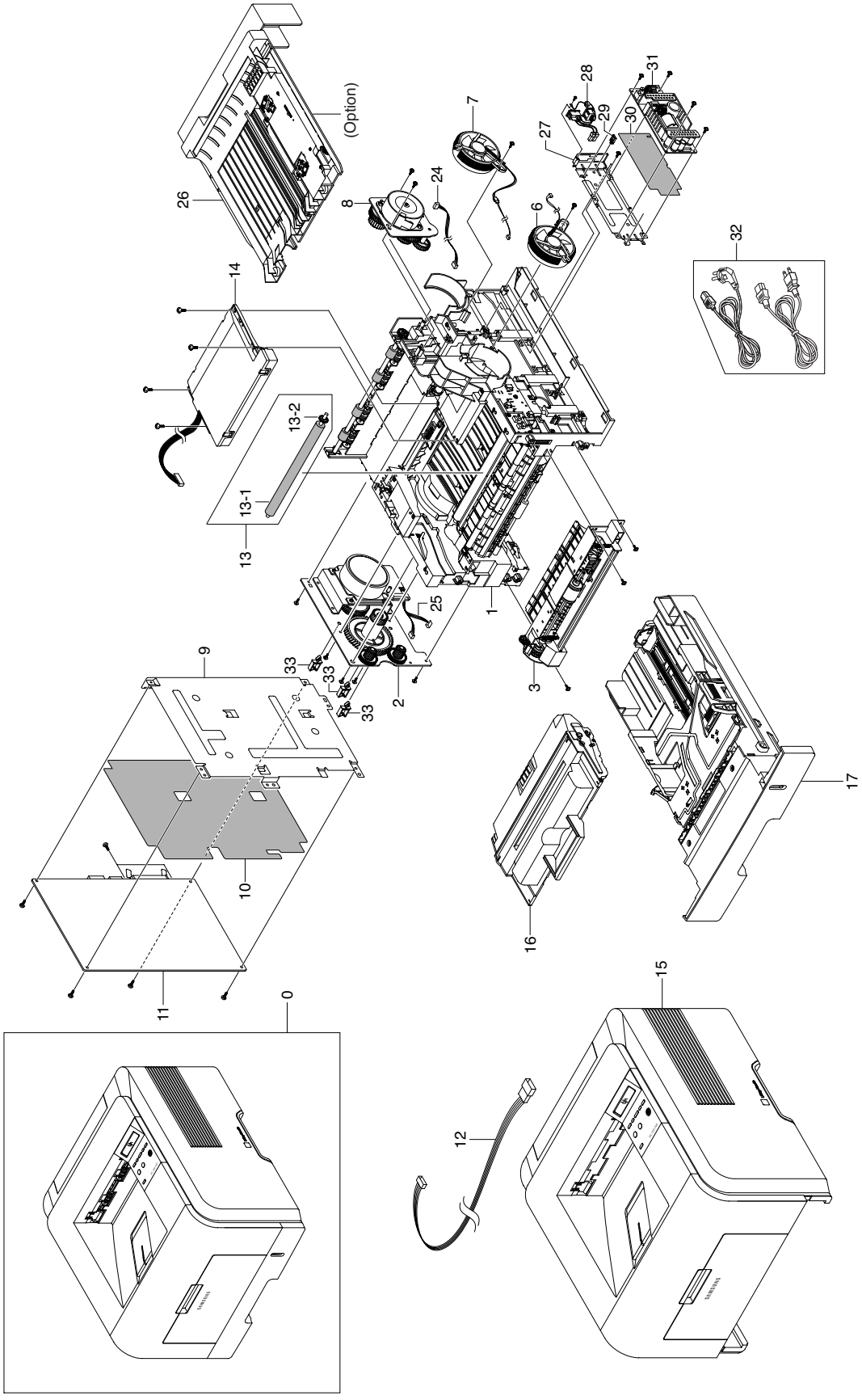
Contents

LASER PRINTER

The keynote of Product

- Speed: Up to 33ppm (Ltr. 35ppm), 1200x1200dpi Effective output
- Paper Path: MPF Type Cassette
- Emulation: PCL6, PS3
- CPU: SPGPv3
- Memory: 16~64MB Standard
- Cassette: 250 sheet Cassette
- MP: 50 sheet MP
- Lan: 10/100 Base TX (ML-3471ND)
- I/O: USB 2.0, IEEE1284
- Toner: 10K Toner (4K initial)
- Option: 802.11b/g Wireless N/W, 250 sheet Opt. SCF
- Duplex: Built in Duplex

5.1 Main

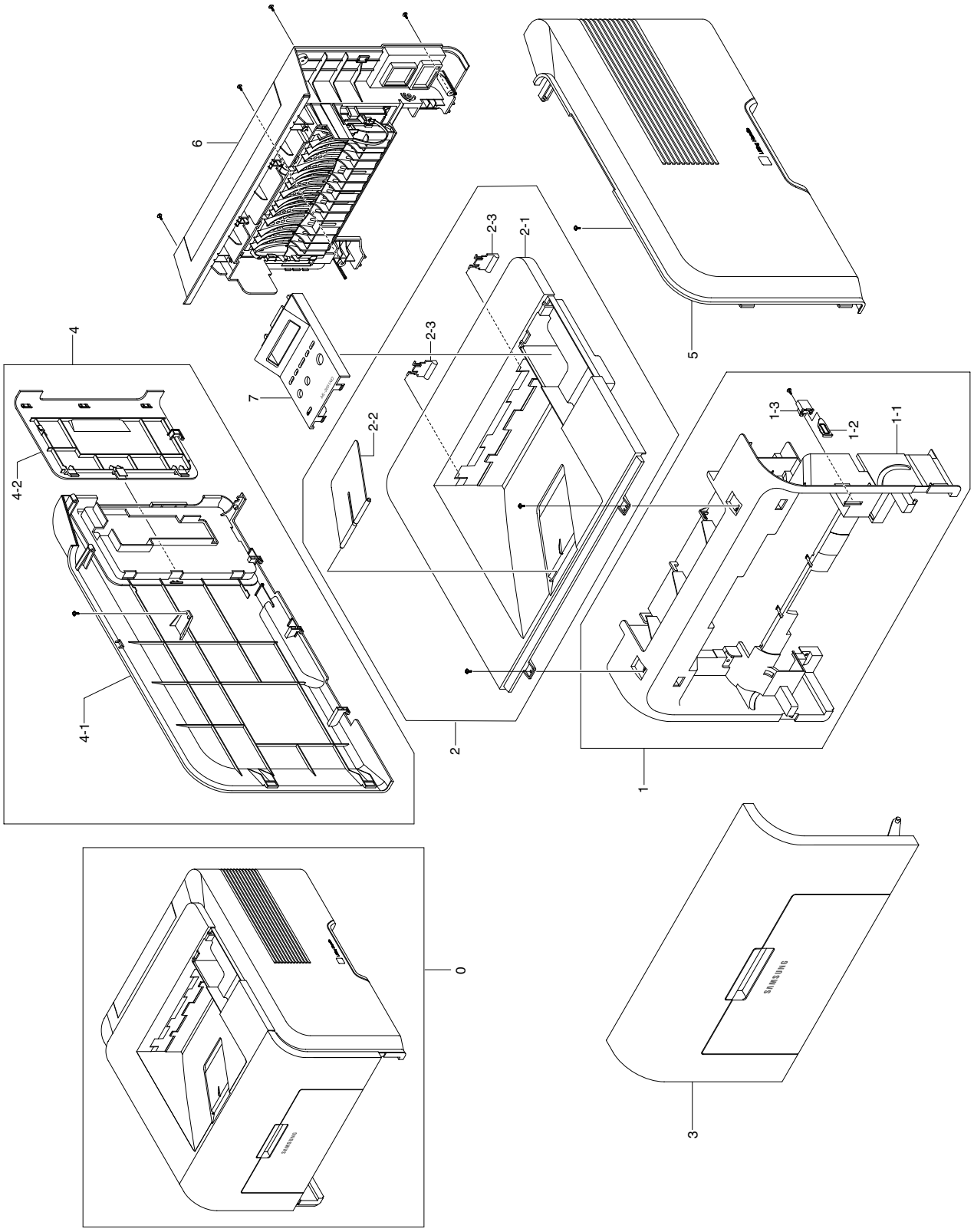

(Option)
26
8
24
7
27
28
29
30
31
6
32
14
13-2
13-1
13
25
1
3
2
33
33
33
9
10
11
0
16
17
15
12

Main Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.1-0	-	SET				
5.1-1	JC96-04522B	ELA HOU-FRAME 220V	D2103	1	SA	
5.1-1	JC96-04522A	ELA HOU-FRAME 110V	D2103	1	SA	
5.1-2	JC96-03761A	ELA UNIT-MAIN DRIVE	D2101	1	SA	
5.1-3	JC96-04706A	ELA HOU-MPF	D2156	1	SA	
5.1-6	JC31-00025A	FAN-DC	F0002	1	SA	
5.1-7	JC31-00025B	FAN-DC	D2107	1	SA	
5.1-8	JC96-04634A	ELA UNIT-MAIN DRIVE	D2100	1	SA	
5.1-9	JC97-02697A	MEA-SHIELD CONTROLLER	D2102	1	SA	
5.1-10	JC63-00962A	SHEET-INSULATOR_PBA	B2103	1	SNA	
5.1-11	JC92-01898A	PBA MAIN-CONTROLLER	D2104	1	SA	
5.1-12	JC39-00532A	CBF HARNESS-LCD_OPE	D2113	1	SA	
5.1-13	JC97-02652A	MEA-TRANSFER ROLLER	D2128	1	SA	
5.1-13-1	JC66-01181A	ROLLER-TRANSFER	D2146	1	SA	
5.1-13-2	JC66-00395A	GEAR-TRANSFER	G0448	1	SA	
5.1-14	JC59-00027A	UNIT-LSU	D2115	1	SA	
5.1-15	JC97-02924A	MEA-COVER	D2105	1	SNA	
5.1-16	JC96-04617A	ELA UNIT-INITIAL DEVE(CARTRIDGE-TONER)		1	SNA	
5.1-17	JC97-02415A	MEA UNIT-CASSETTE	D2106	1	SA	
5.1-24	JC39-00767A	CBF HARNESS-EXIT MTR	A2107	1	SA	New
5.1-25	JC39-00527A	CBF HARNESS-MAIN MTR	D2111	1	SA	
5.1-26	JC97-02393A	MEA UNIT-DUPLEX	D2105	1	SA	
5.1-27	JC63-00913A	SHIELD-P-SMPS	A2108	1	SNA	
5.1-28	JC39-00523A	CBF HARNESS-AC INLET	D2110	1	SA	
5.1-29	6502-000132	CABLE CLAMP	C0069	3	SA	
5.1-30	JC63-00960A	SHEET-INSULATOR_SMPS	A2109	1	SNA	
5.1-31	JC44-00090A	SMPS-PSP_TYPE3_V2C	D2114	1	SA	
5.1-31	JC44-00097A	SMPS-PSP_TYPE3_V1	D2114	1	SA	
5.1-32	3903-000042	CBF-POWER CORD(220V)	K2903	1	SA	
5.1-32	3903-000085	CBF-POWER CORD(110V)	K2903	1	SA	
5.1-33	6502-000121	CABLE CLAMP	C0069	3	SA	

5.2 Cover Ass'y

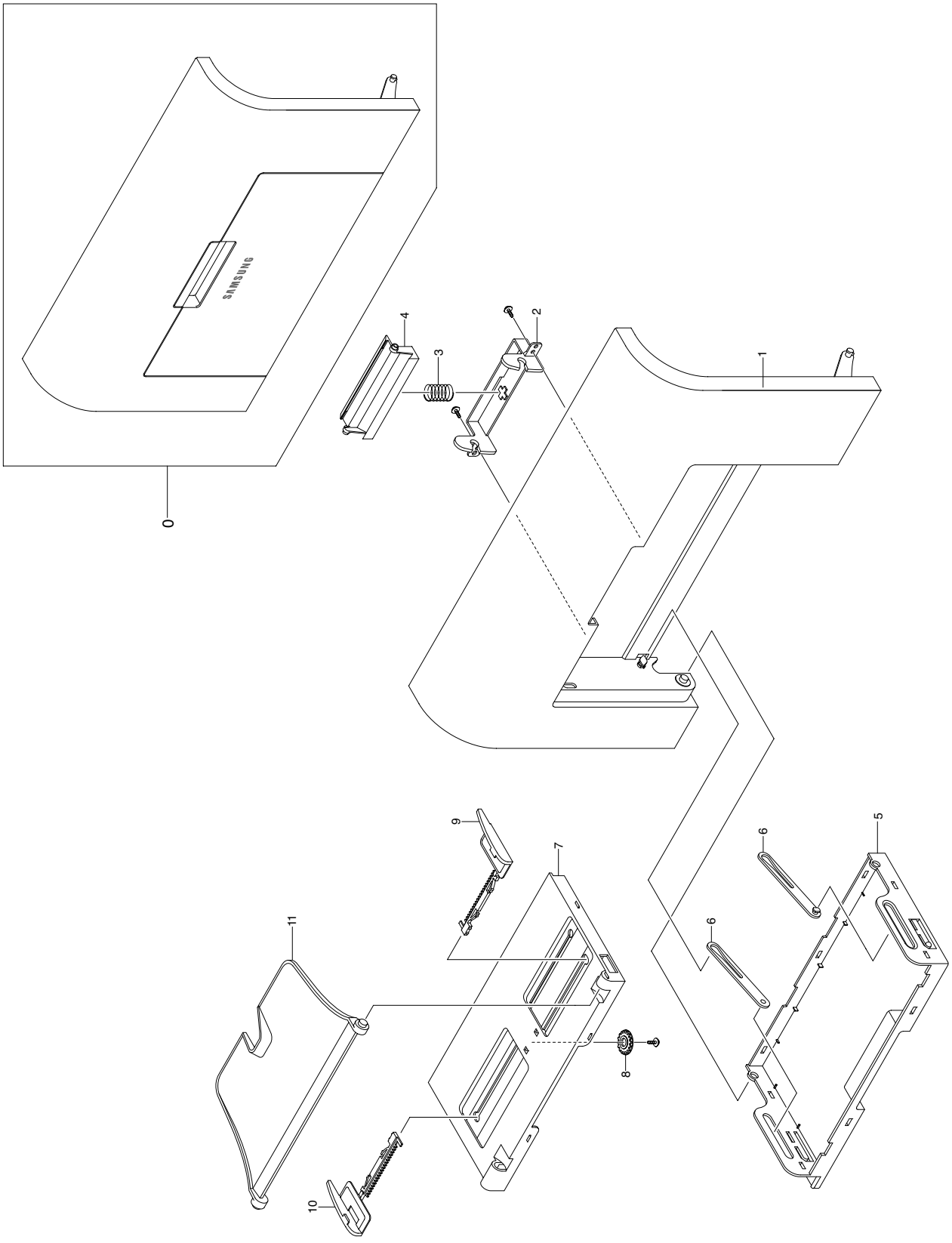


Cover Ass'y Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.2-0	JC97-02924B	MEA-COVER	D2105	1	SNA	
5.2-0	JC97-02924A	MEA-COVER	D2105	1	SNA	
5.2-1	JC97-02399A	MEA-COVER MIDDLE	D2126	1	SA	
5.2-1-1	JC63-00964A	COVER-M_MIDDLE	A2126	1	SNA	
5.2-1-2	JC72-01339A	PMO-M-SUB ACTUATOR	A0004	1	SNA	
5.2-1-3	JC67-00068C	CAP-M_SUB ACTUATOR	A2127	1	SNA	
5.2-2	JC97-02442A	MEA-COVER TOP	D2127	1	SA	
5.2-2-1	JC63-00970A	COVER-M_TOP	D2142	1	SA	
5.2-2-2	JC72-01346D	PMO-STACKER RX	D2150	1	SA	
5.2-2-3	JC72-01343A	PMO-SUB STACKER	Z4139	2	SA	
5.2-3	JC97-02396A	MEA-COVER FRONT	D2123	1	SA	
5.2-4	JC97-02397A	MEA-COVER SIDE L	D2124	1	SA	
5.2-4-1	JC63-00966A	COVER-M_SIDE L	D2140	1	SA	
5.2-4-2	JC63-00967A	COVER-M_DIMM	D2141	1	SA	
5.2-5	JC97-02882A	MEA-COVER SIDE R	A2128	1	SA	
5.2-6	JC97-02732C	MEA-COVER REAR	D2129	1	SA	
5.2-7	JC97-02923A	ELA HOU-COVER OPE	A2130	1	SA	

5.3 Front Cover Ass'y

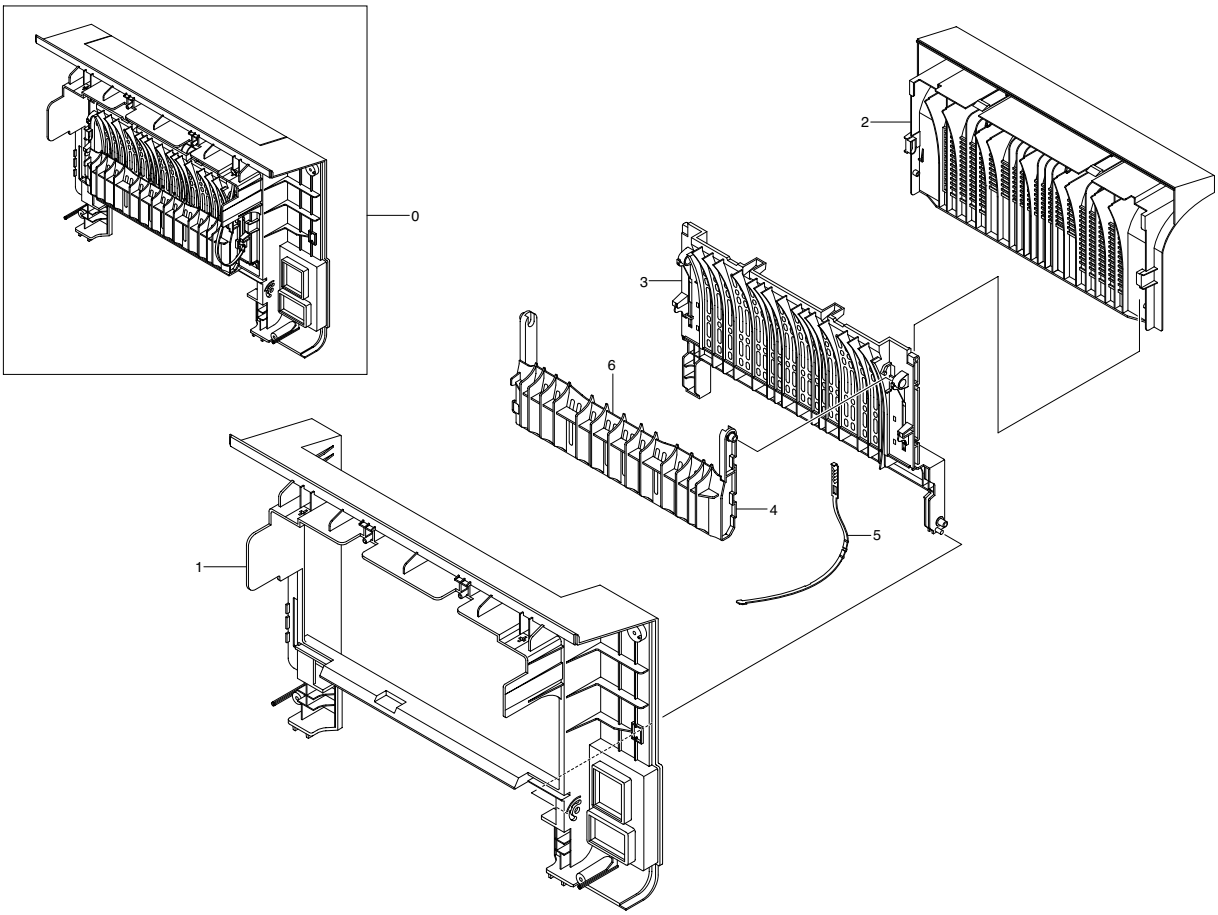


Front Cover Ass'y Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.3-0	JC97-02396A	MEA-COVER FRONT	D2123	1	SA	
5.3-1	JC63-00969A	COVER-M_FRONT	A2123	1	SNA	
5.3-2	JC61-01588A	HOLDER-M_LOCKER	D2136	1	SA	
5.3-3	JG61-70549A	SPRING ETC-CIS(C2)	C5029	1	SA	
5.3-4	JC64-00233A	KNOB-M_LOCKER	D2143	1	SA	
5.3-5	JC63-00971A	TRAY-M-ASF_INPUT	T4137	1	SNA	
5.3-6	JC63-00444A	TRAY-M-LINK_MP	T4137	2	SA	
5.3-7	JC63-00446E	TRAY-M-ASF_INPUT UPPER	D2137	1	SA	
5.3-8	JG66-40003A	GEAR-PINION	G0035	1	SA	
5.3-9	JC70-00479D	ADJUST-M_MP R	T4138	1	SNA	
5.3-10	JC70-00478D	ADJUST-M_MP L	T4139	1	SNA	
5.3-11	JC63-00447E	TRAY-M-ASF_FOLDER	D2138	1	SA	

5.4 Rear Cover Ass'y

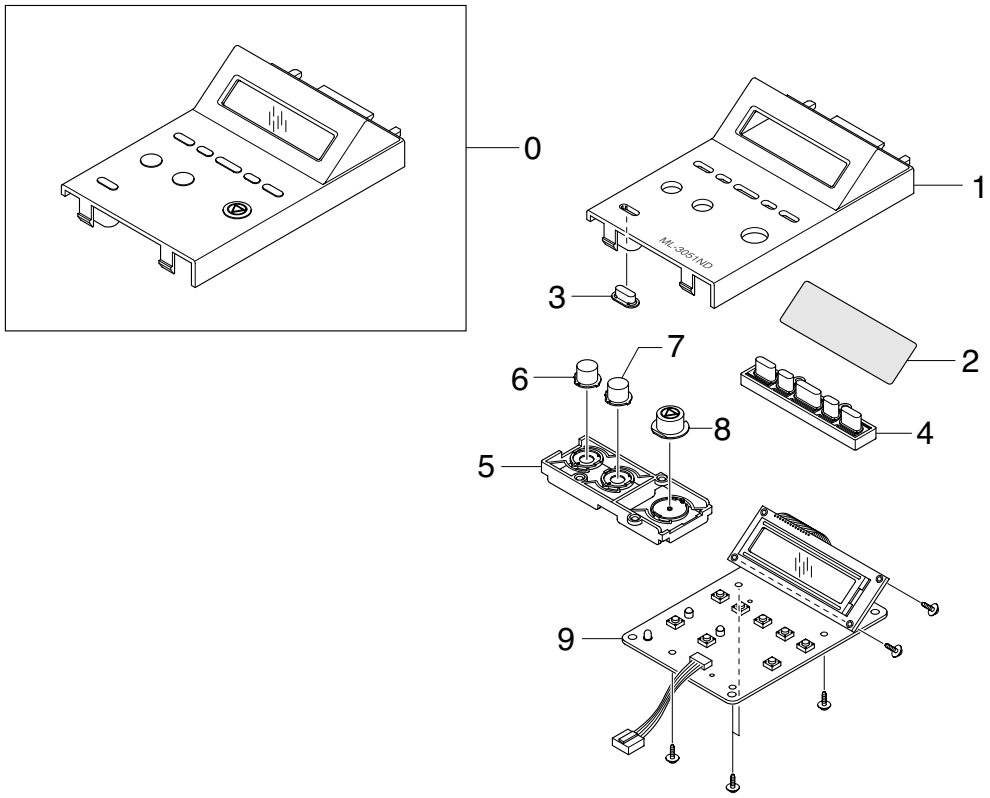


Rear Cover Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.4-0	JC97-02398D	MEA-COVER REAR	D2129	1	SA	
5.4-1	JC63-00978C	COVER-REAR	D2130	1	SA	
5.4-2	JC63-00968A	COVER-M_FACE UP	C2131	1	SNA	
5.4-3	JC63-00937A	COVER-M STACKER REAR	A2132	1	SNA	
5.4-4	JC61-01583A	GUIDE-OUTPUT FUSER	A2133	1	SNA	
5.4-5	JC61-01653A	STOPPER-M-STRAP	A2134	1	SNA	
5.4-6	JC61-01944A	GUIDE-OUTPUT F UPPER	A2135	1	SNA	

5.5 OPE Cover Ass'y

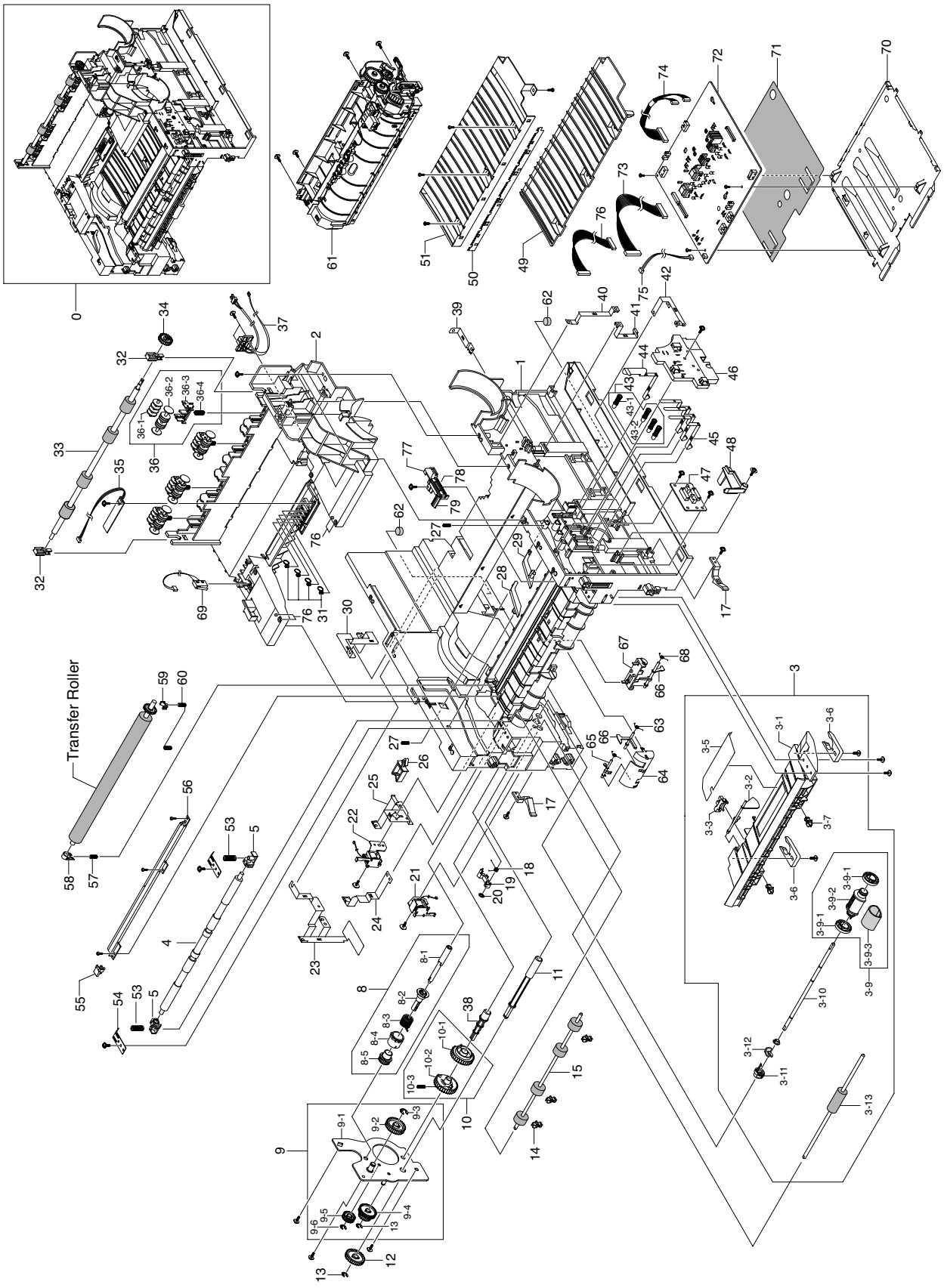


OPE Cover Ass'y Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.5-0	JC97-02923A	ELA HOU-COVER OPE	D2130	1	SA	
5.5-1	JC63-00972P	COVER-M_KEY MENU_LCD	D2131	1	SNA	
5.5-2	JC72-00672A	PCT-LCD WINDOW	B2132	1	SNA	
5.5-3	JC67-00147A	LENS LED-M_STATUS	Z4432	1	SNA	
5.5-4	JC64-00234A	KEY-M_MENU	B2133	1	SNA	
5.5-5	JC64-00235A	KEY-M_BUTTON	B2134	1	SNA	
5.5-6	JC64-00047A	KEY-M-SAVE MODE	K0049	1	SA	
5.5-7	JC64-00254A	KEY-M_DEMO	B2135	1	SNA	
5.5-8	JC64-00236A	KEY-M_STOP	Z4435	1	SNA	
5.5-9	JC92-01750A	PBA SUB-OPE	D2153	1	SA	

5.6 Frame



Frame Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.6-0	JC96-04522B	ELA HOU-FRAME 220V	D2103	1	SA	220V
5.6-0	JC96-04522A	ELA HOU-FRAME 110V	D2103	1	SA	110V
5.6-1	JC61-01620A	FRAME-M_BASE	A2104	1	SNA	
5.6-2	JC61-01941A	FRAME-M_EXIT	A2105	1	SNA	
5.6-3	JC96-03829B	ELA HOU-GUIDE DUP F	A2106	1	SNA	
5.6-3-1	JC61-01600A	GUIDE-M_FRONT DUPLEX	B2107	1	SNA	
5.6-3-2	JC66-01187A	LEVER-ACTUATOR EMPTY	D2171	1	SA	
5.6-3-3	0604-001095	PHOTO-INTERRUPTER	P0013	1	SA	
5.6-3-5	JC63-00992A	SHEET-GUIDE FRONT DU	B2108	1	SNA	
5.6-3-6	JC66-00050A	CAM-CATCH	C0004	2	SA	
5.6-3-7	JC72-00382B	PMO-BUSHING FEED	O1102	2	SA	
5.6-3-9	JC97-02441A	MEA-ROLLER PICK UP	D2175	1	SA	
5.6-3-9-1	JC66-01169A	ROLLER-IDLE PICK UP	D2181	2	SA	
5.6-3-9-2	JC61-01601A	HOUSING-M_PICK UP	D2178	1	SA	
5.6-3-9-3	JC66-01168A	ROLLER-PICK UP	D2180	1	SA	
5.6-3-10	JC66-01171A	SHAFT-PICK UP	B2109	1	SNA	
5.6-3-11	JC66-01581A	CAM-SHAFT PICK UP	A2110	1	SNA	
5.6-3-12	JC72-41364A	PMO-BUSHING_P/U,MP	P0035	1	SA	
5.6-3-13	JC66-01173A	ROLLER-FEED	D2170	1	SA	
5.6-4	JC66-00527A	SHAFT-FEED IDLE	F6209	1	SA	
5.6-5	JC61-00585A	BUSH-M-FEED IDLE	F6043	2	SA	
5.6-8	JC97-01788A	MEA UNIT-CLUTCH	C9040	1	SA	
5.6-8-1	JC66-00398A	SHAFT-FEED	F6210	1	SA	
5.6-8-2	JC72-00981A	PMO-HUB CLUTCH	A2111	1	SNA	
5.6-8-3	6107-001171	SPRING-TS	Z4161	1	SA	
5.6-8-4	JC72-00978A	PMO-COLLAR_SPRING	Z4125	1	SA	
5.6-8-5	JC66-00393A	GEAR-FEED 1	F6071	1	SA	
5.6-9	JC97-02394A	MEA UNIT-BRACKET FEED	D2112	1	SA	
5.6-9-1	JC61-01582A	BRACKET-P-FEED	D2113	1	SNA	
5.6-9-2	JC66-01166A	GEAR-IDLE Z29 HELICAL	D2114	1	SNA	
5.6-9-3	6044-000231	RING-E	R0006	1	SA	
5.6-9-4	JC66-01164A	GEAR-RETARD 39/19	D2115	1	SNA	
5.6-9-5	JC66-00484A	GEAR-T2 IDEL_Z27	G0432	1	SA	
5.6-9-6	6044-000125	RING-E	R0004	2	SA	
5.6-10	JC97-02648A	MEA UNIT-GEAR PICK UP	D2157	1	SA	
5.6-10-1	JC66-01183A	GEAR-PICK UP_INNER	D2116	1	SNA	
5.6-10-2	JC66-01184A	GEAR-PICK UP_OUTER	D2117	1	SNA	
5.6-10-3	6107-001167	SPRING-CS	Z4318	1	SA	
5.6-11	JC66-01160A	SHAFT-M_FEED2	D2118	1	SNA	
5.6-12	JC66-01165A	GEAR-FEED2 Z27	D2119	1	SNA	
5.6-13	6044-000125	RING-E	R0004	1	SA	
5.6-14	JC72-00382B	PMO-BUSHING FEED	O1102	3	SA	
5.6-15	JC66-00526A	ROLLER-FEED ROLLER 1	F6201	1	SA	

Frame Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

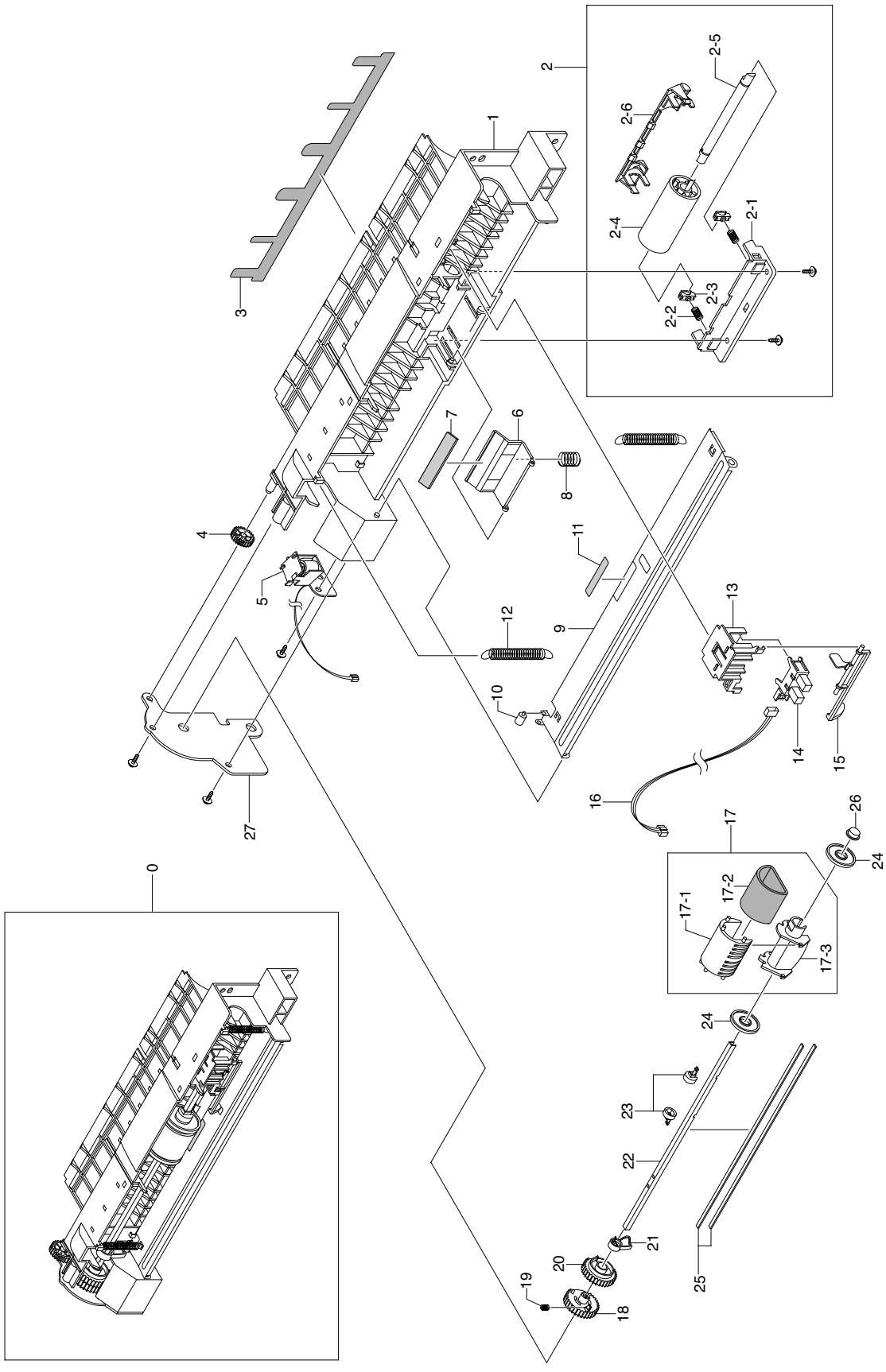
Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.6-17	JC72-00983A	PMO-LOCKER CST	L6030	2	SA	
5.6-18	6107-001352	SPRING-TS	Z4317	1	SA	
5.6-19	JC66-00377A	CAM-M-PICK_UP	P2042	1	SA	
5.6-20	6044-000001	RING-CS	Z4513	1	SNA	
5.6-21	JC33-00025A	SOLENOID-MANUAL	D2120	1	SNA	New
5.6-22	JC33-00027A	SOLENOID-FEED	D2121	1	SA	New
5.6-23	JC63-00917A	GROUND-P-DRIVE	D2122	1	SNA	
5.6-24	JC63-00923A	GROUND-P-PUSH BUSHING	B2123	1	SNA	
5.6-25	JC63-00922A	GROUND-P-DRIVE2	A2124	1	SNA	
5.6-26	6502-001093	CABLE CLAMP	C0002	1	SA	
5.6-27	JC61-70932A	SPRING ETC-GUIDE DEVE	Z4159	2	SA	
5.6-28	JC72-00984A	PMO-PLATE GUIDE DEVE_L	G2285	1	SA	
5.6-29	JC72-00985A	PMO-PLATE GUIDE DEVE_R	G2286	1	SA	
5.6-30	JC63-00926A	GROUND-P-SHIELD	A2125	1	SNA	
5.6-31	JC65-00019A	TERMINAL-P_CRUM	D2144	4	SA	
5.6-32	JC61-00829A	HOLDER-BEARING EXIT F/DOWN	H4009	2	SA	
5.6-33	JC97-01034A	MEA RACK-EXIT ROLLER	E4060	1	SA	
5.6-34	JC66-01196A	ROLLER-EXIT F/DOWN	B2126	1	SA	
5.6-35	JC92-01829A	PBA SUB-TERMINAL	Z4319	1	SA	
5.6-36	JC97-01034A	MEA RACK-EXIT ROLLER	E4060	4	SA	
5.6-36-1	JC72-41008A	PMO-ROLLER FD R	P0049	1	SA	
5.6-36-2	JC72-41007A	PMO-ROLLER FD F	P0048	1	SA	
5.6-36-3	JC72-41006A	PMO-HOLDER EXIT ROLL	E4126	1	SA	
5.6-36-4	JC61-70911A	SPRING ETC-EXIT ROLL FD	O1053	1	SA	
5.6-39	JC63-00920A	GROUND-P-FUSER	B2127	1	SNA	
5.6-40	JC63-00925A	GROUND-P-MOTOR FUSER	B2128	1	SNA	
5.6-41	JC63-00924A	GROUND-P-SHIELD SMPS	A2129	1	SNA	
5.6-42	JC63-00921A	GROUND-P-GUIDE TR	B2130	1	SNA	
5.6-43	JC75-00049A	MEC-TERMINAL	K3739	4	SA	
5.6-43-1	JC61-00035A	SPRING ETC-HV APOLLO	A2131	1	SNA	
5.6-43-2	JC70-00050A	IPR-TERMINAL	Z4562	1	SNA	
5.6-44	JC65-00014A	TERMINAL-P-HV CR	C2132	1	SNA	
5.6-45	JC70-00312A	IPR-P-TERMINAL CON	K3385	3	SA	
5.6-46	JC61-01584A	HOUSING-M_TERMINAL	C2133	1	SNA	
5.6-47	JC92-01944A	PBA-CONNECTOR	C2134	1	SA	New
5.6-48	JC72-00974A	PMO-ACTUATOR CVR OPEN	O1073	1	SA	
5.6-49	JC61-01942A	GUIDE-TR RIB	C2135	1	SNA	
5.6-50	JC61-00604B	PLATE-E_SAW	P5152	1	SA	
5.6-51	JC61-01943A	GUIDE-P-TR	C2136	1	SNA	
5.6-53	JC61-70958A	SPRING ETC-TR	Z4163	2	SA	
5.6-54	JC61-00914A	PLATE-P-PUSH BUSHING	K3234	2	SNA	
5.6-55	JC61-00907A	HOLDER-M-PTL R2	H4041	1	SA	
5.6-56	JC70-00307A	IPR-P-EARTH TRANSFER	O1094	1	SA	

Frame Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.6-57	JC61-00047A	SPRING ETC-TR L HAWK	O1030	1	SA	
5.6-58	JC61-00588A	BUSH-M-TR L	K2886	1	SA	
5.6-59	JC72-00102A	PMO-BUSHING_TR(L)	O1101	1	SA	
5.6-60	JC63-00918A	GROUND-P-EARTH TR	C2137	1	SNA	
5.6-61	JC96-04535A	ELA UNIT-FUSER(220V)	D2122	1	SA	
5.6-61	JC96-04534A	ELA UNIT-FUSER(110V)	D2122	1	SA	
5.6-62	JC61-00835A	FOOT-BACK	F1010	2	SA	
5.6-63	6107-001164	SPRING-TS	Z4156	3	SA	
5.6-64	JC61-01619A	HOLDER-M_ACT REGI	C2123	1	SNA	
5.6-65	JC66-01191A	LEVER-M_ACTUATOR REGI	B2124	1	SA	
5.6-66	JC66-01190A	LEVER-M_ACT DUP OUT	B2125	1	SA	
5.6-67	JC61-01618A	HOLDER-M_ACT FEED	C2126	1	SNA	
5.6-68	6107-001164	SPRING-TS	Z4156	3	SA	
5.6-69	JC39-00524A	CBF HARNESS-LSU S/W	D2133	1	SA	
5.6-70	JC63-00914A	SHIELD-P-HVPS	C2127	1	SNA	
5.6-71	JC63-00961A	SHEET-INSULATOR_HVPS	C2128	1	SNA	
5.6-72	JC44-00157A	HVPS-CYGNUS	B2129	1	SA	New
5.6-73	JC39-00519A	CBF HARNESS-SMPS	D2164	1	SA	
5.6-74	JC39-00518A	CBF HARNESS-ENGINE	D2163	1	SA	
5.6-75	JC39-00528A	CBF HARNESS-PAPER EMP	D2166	1	SA	
5.6-76	JC61-02155A	PLATE-LSU SUPPORT	C2130	1	SNA	

5.7 MP Ass'y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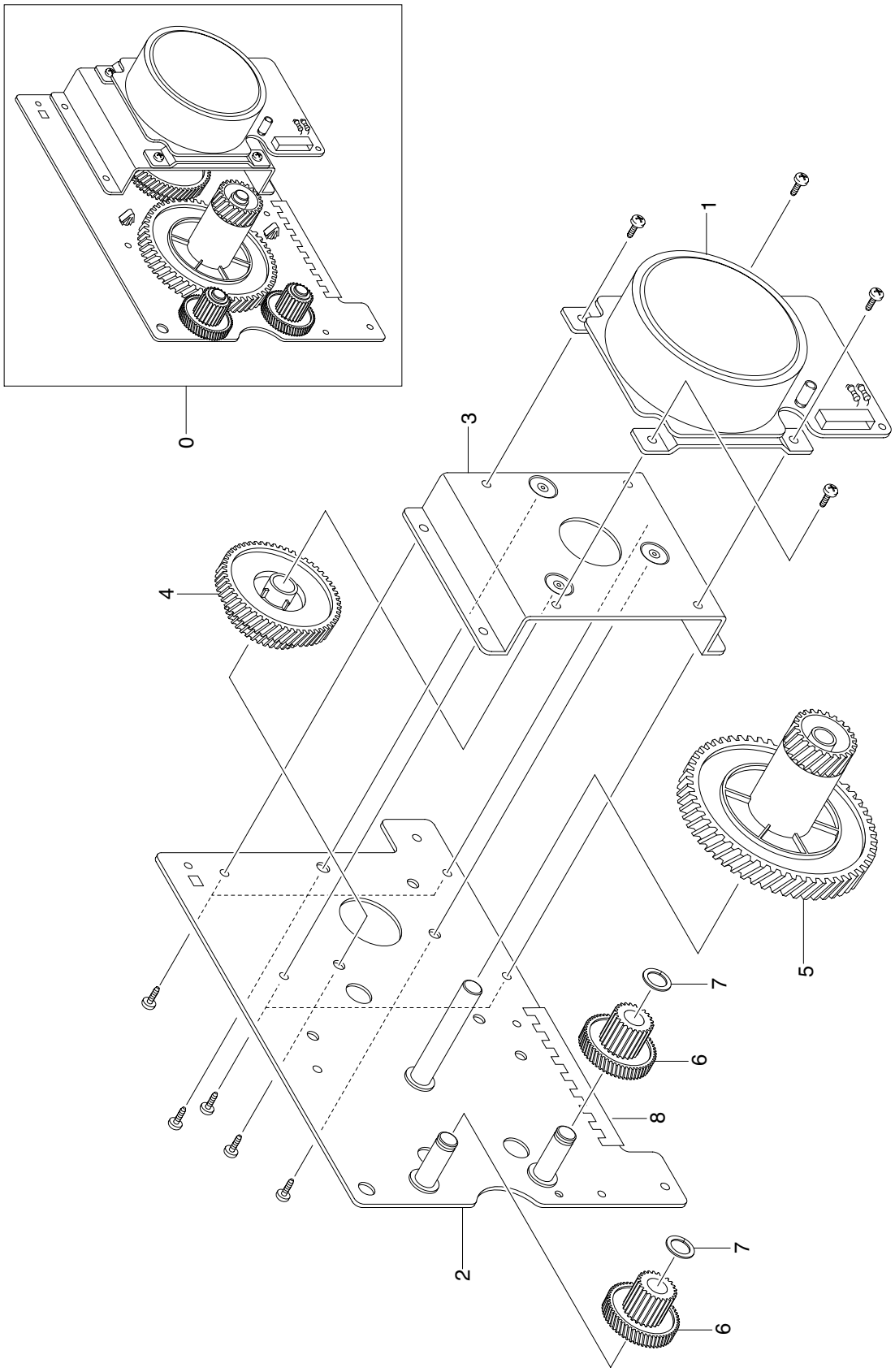
MP Ass'y Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.7-0	JC96-04706A	ELA HOU-MPF	D2156	1	SA	
5.7-1	JC61-01603A	FRAME-M_MP	D2157	1	SNA	
5.7-2	JC97-02443A	MEA-IDLE FEED	D2158	1	SNA	
5.7-2-1	JC61-01604A	HOLDER-M_IDLE FEED	D2159	1	SNA	
5.7-2-2	JC61-00484A	SPRING ETC-EXIT LOWER IDLE	Z4180	2	SA	
5.7-2-3	JC61-01605A	HOLDER-M_SHAFT IDLE	D2160	2	SNA	
5.7-2-4	JC66-01186A	ROLLER-IDLE FEED	D2161	1	SNA	
5.7-2-5	JC66-01172A	SHAFT-IDLE FEED	D2162	1	SNA	
5.7-2-6	JC63-00997A	COVER-M_IDLE FEED	D2163	1	SNA	
5.7-3	JC63-01094A	SHEET-GUIDE MP	D2169	1	SA	
5.7-4	JC66-00396A	GEAR-IDLE 23	G0256	1	SA	
5.7-5	JC33-00028A	SOLENOID-MP	D2164	1	SA	
5.7-6	JC61-00924A	HOLDER-M-PAD_MP	H4029	1	SA	
5.7-7	JC73-00140A	RPR-FRICTION PAD	P0034	1	SA	
5.7-8	JC61-70911A	SPRING ETC-EXIT ROLL FD	O1053	1	SA	
5.7-9	JC61-00927A	PLATE-P-KNOCK UP_MP	D2165	1	SNA	
5.7-10	JC72-00761A	PMO-ROLLER CAM.MP	K4061	1	SA	
5.7-11	JC73-00141A	RPR-PAD CASSETTE	R0020	1	SA	
5.7-12	6107-001237	SPRING-ES	D2166	2	SA	
5.7-13	JC61-00926A	HOLDER-M-SENSOR_MP	H4108	1	SA	
5.7-14	0604-001095	PHOTO-INTERRUPTER	P0013	1	SA	
5.7-15	JC72-01338A	PMO-M-ACT EMPTY MP	K3119	1	SA	
5.7-16	JC39-00365A	CBF HARNESS-MPF SEN	H1168	1	SA	
5.7-17	JC97-02034A	MEA-PICK UP_MP	D2174	1	SA	
5.7-17-1	JC73-00194A	RUBBER-PICK UP MP	P2148	1	SA	
5.7-17-2	JC61-00925A	HOUSING-M_PICK UP_MP	D2177	1	SA	
5.7-17-3	JC61-00910A	HOUSING-M-PICK UP2_R2	M2078	1	SA	
5.7-18	JC66-00710A	GEAR-M-PICK UP_MP	P2110	1	SA	
5.7-19	6107-001167	SPRING-CS	Z4318	1	SA	
5.7-20	JC66-00709A	GEAR-M-HOLDER_MP	H4073	1	SA	
5.7-21	JC66-01205A	CAM-M_PICK UP MP	D2172	1	SA	
5.7-22	JC66-00399A	SHAFT-P-PICK_UP	P2160	1	SA	
5.7-23	JC61-00915A	STOPPER-M-PICK UP_R2	K3752	2	SA	
5.7-24	JC72-00982A	PMO-IDLE PICK_UP	P2131	2	SA	
5.7-25	JC66-00720A	SHAFT-P-CORE	O1068	2	SA	
5.7-26	JC61-00587A	BUSH-M-PICK_UP R	P2067	1	SA	
5.7-27	JC61-00932A	BRACKET-P-PICKUP_MP	P2122	1	SA	

5.8 Main Drive Ass'y

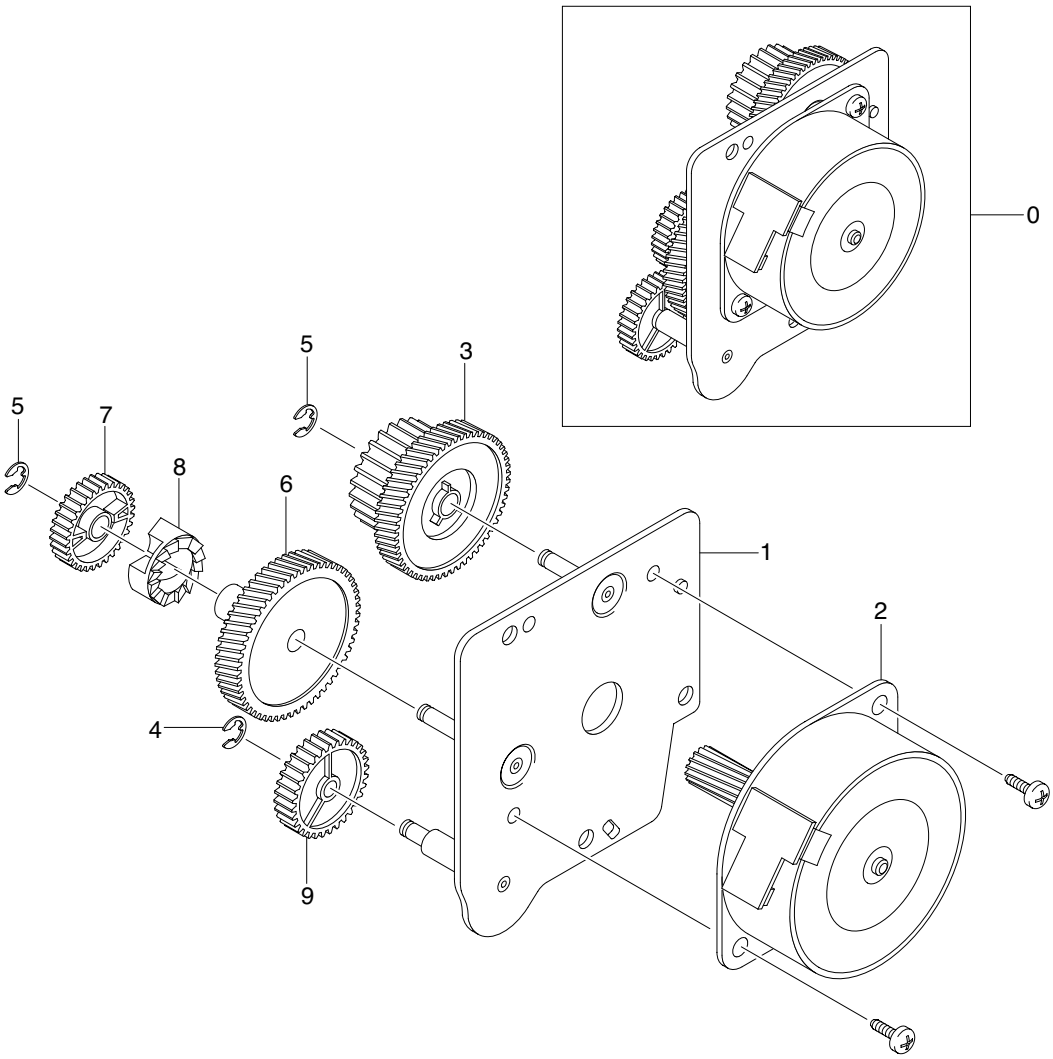


Main Drive Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.8-0	JC96-03761A	ELA UNIT-MAIN DRIVE	D2101	1	SA	
5.8-1	JC31-00047A	MOTOR DC-BLDC MAIN	D2108	1	SA	
5.8-2	JC61-01593A	BRACKET-P-GEAR MAIN	D2167	1	SNA	
5.8-3	JC61-01597A	BRACKET-P-MOTOR MAIN	D2168	1	SNA	
5.8-4	JC66-01156A	GEAR-OPC RDCN 93/61	D2169	1	SNA	
5.8-5	JC66-01157A	GEAR-OPC DRV 113/33	D2170	1	SNA	
5.8-6	JC66-01162A	GEAR-FEED RDCN 55/18	D2171	2	SNA	
5.8-7	6031-000023	WASHER-PLAIN	Z6227	2	SA	
5.8-8	6302-001056	GASKET		0.2	SNA	

5.9 Fuser Drive Ass'y

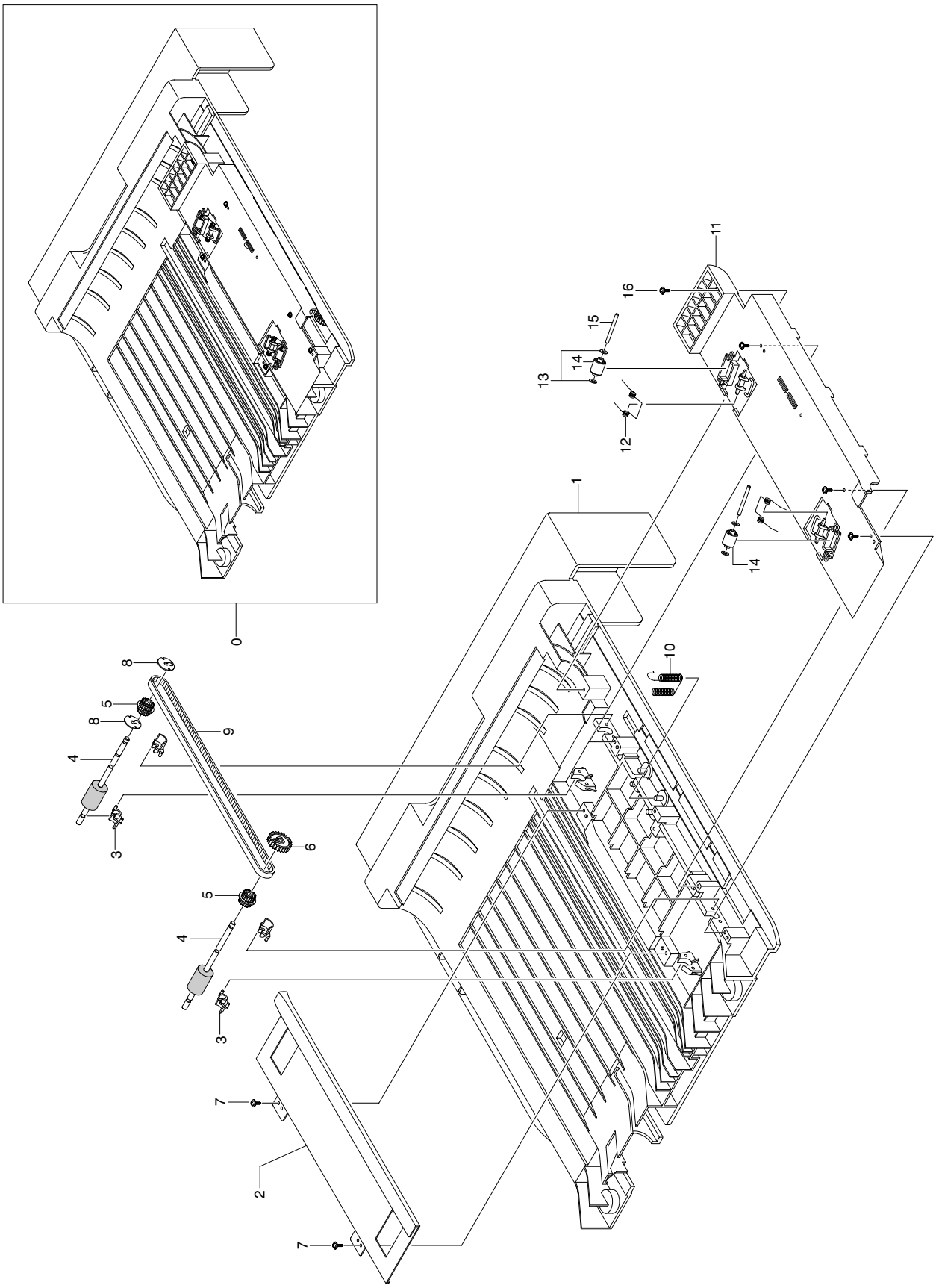


Fuser Drive Ass'y Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.9-0	JC96-04634A	ELA HOU-FUSER DRIVE	D2100	1	SA	
5.9-1	JC61-01598A	BRACKET-P-FUSER EXIT	B2102	1	SNA	
5.9-2	JC31-00084A	MOTOR STEP-MAIN	C2103	1	SA	
5.9-3	JC66-01158A	GEAR-EXIT RDCN 87/24	B2104	1	SNA	
5.9-4	6044-000125	RING-E	R0004	1	SA	
5.9-5	6044-000231	RING-E	R0006	2	SA	
5.9-6	JC66-01163A	GEAR-FUSER RDCN IN 95	D2105	1	SNA	
5.9-7	JC66-00417A	GEAR-RDCN FUSER OUT	F4099	1	SA	
5.9-8	JC66-00340A	GEAR-HUB CLUTCH	C9033	1	SA	
5.9-9	JC66-01210A	GEAR-FUSER IDLE FR	D2173	1	SA	

5.10 Duplex Unit (Optional)

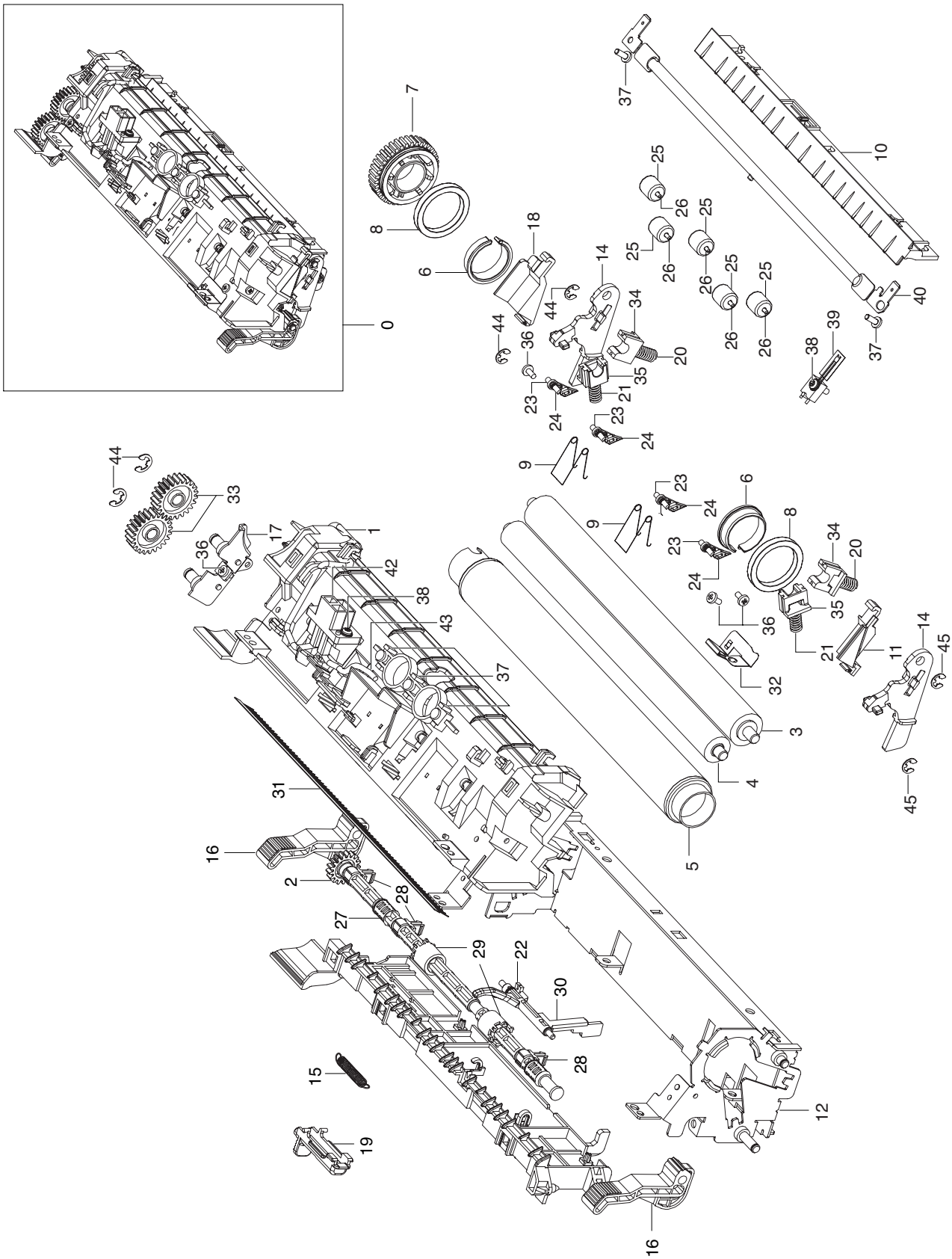


Duplex Unit (Optional) Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.10-0	JC97-02393A	MEA UNIT-DUPLEX	D2105	1	SA	
5.10-1	JC61-01594A	FRAME-M_DUP	B2106	1	SNA	
5.10-2	JC61-01596A	BRACKET-P-ALIGN DUP	D2107	1	SNA	
5.10-3	JC61-00665A	BUSH-M-FEED, DUP	F6042	4	SA	
5.10-4	JC66-01167A	ROLLER-FEED_DUP2	D2108	1	SNA	
5.10-4	JC66-00901A	ROLLER-FEED_DUP	D2145	1	SA	
5.10-5	JC66-00899A	PULLEY-18_DUP	D2118	2	SA	
5.10-6	JC66-00038A	GEAR-EXIT F/DOWN	E4039	1	SA	
5.10-7	6003-000196	SCREW-TAPTITE	Z4397	2	SA	
5.10-8	6044-000107	RING-C	Z4396	1	SA	
5.10-9	JC66-20901A	BELT-TIMMING	B2018	1	SA	
5.10-10	JC65-00017A	TERMINAL-P-GND DUP	D2109	2	SNA	
5.10-11	JC61-01595A	GUIDE-M_UPPER DUP	D2110	1	SNA	
5.10-12	6107-001156	SPRING-TS	Z4317	2	SA	
5.10-13	JK72-00058A	PCT-SILP WASHER	D2111	4	SNA	
5.10-14	JC66-00896A	ROLLER-M-IDLE_ DUP	D2117	2	SA	
5.10-15	JC66-00444A	SHAFT-IDLE ROLL, DUP	S4108	2	SA	
5.10-16	6003-000196	SCREW-TAPTITE	Z4397	4	SA	
-	JC96-03662B	ELA UNIT-ROLLER_DUP2		1	SNA	
-	JC96-03662A	ELA UNIT-ROLLER_DUP		1	SNA	

5.11 Fuser Unit



Fuser Unit Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

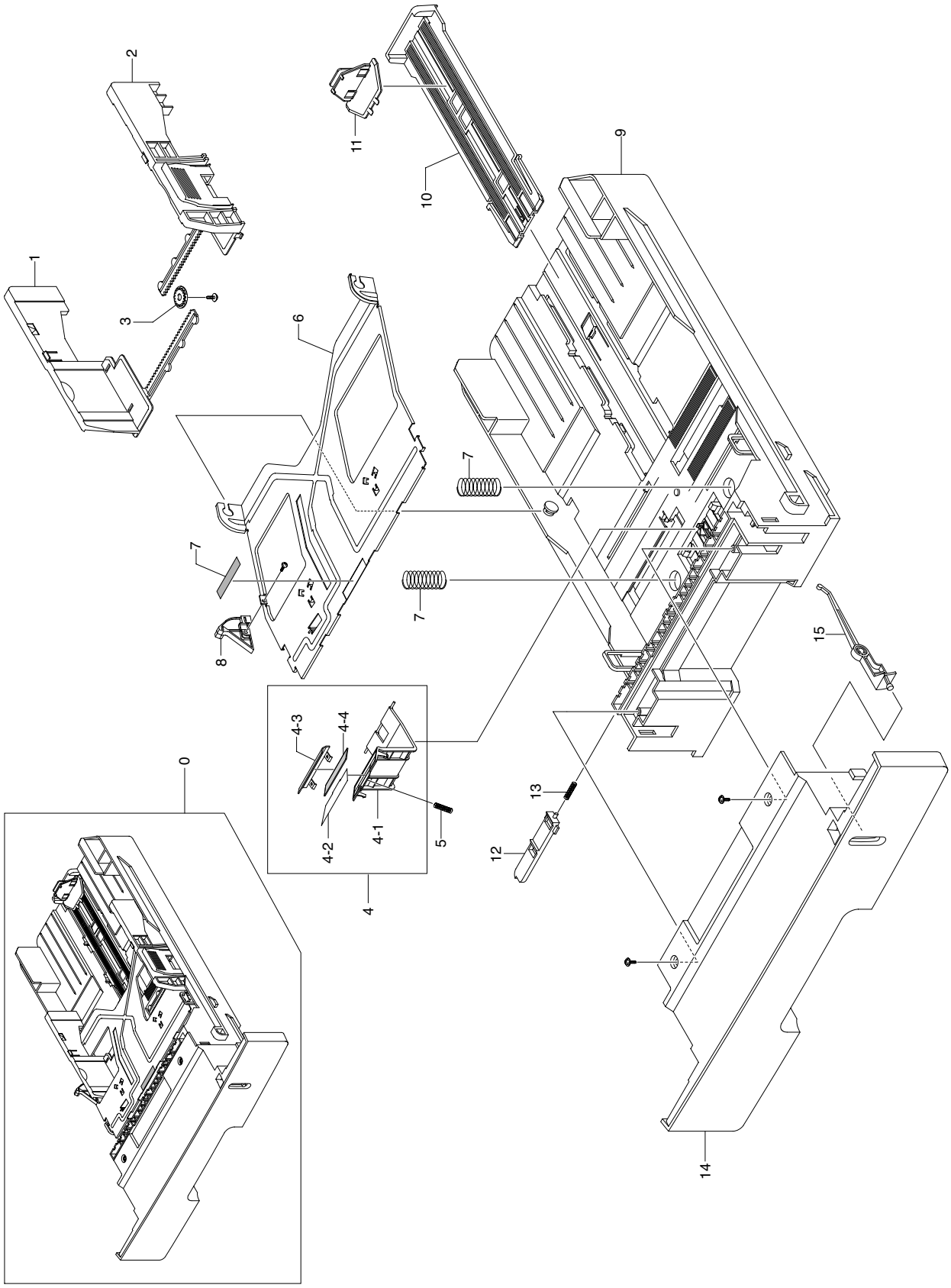
Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.11-0	JC96-04534A	ELA UNIT-FUSER	D2122	1	SA	110V
5.11-0	JC96-04535A	ELA UNIT-FUSER	D2122	1	SA	220V
5.11-1	JC63-01347A	COVER-FUSER_UPPER	D2123	1	SNA	
5.11-2	JC66-01583A	GEAR-EXIT	D2124	1	SNA	
5.11-3	JC66-01453A	ROLLER-PRESSURE	Z4588	1	SNA	
5.11-4	JC66-01079A	ROLLER-PRESSURE	Z4588	1	SA	
5.11-5	JC66-01593A	ROLLER-HEAT	D2125	1	SNA	
5.11-6	JC61-01958A	BUSH-HR_R	D2126	2	SNA	
5.11-7	JC66-01588A	GEAR-FUSER	D2127	1	SNA	
5.11-8	6601-001479	BEARING-BALL	D2128	2	SNA	
5.11-9	6107-001159	SPRING-TS	Z4394	2	SA	
5.11-10	JC61-01949A	GUIDE-INPUT	C2129	1	SNA	
5.11-11	JC67-00253A	CAP-LAMP_L	D2130	1	SNA	
5.11-12	JC61-01948A	FRAME-FUSER	B2131	1	SNA	
5.11-13	JC61-01955A	GUIDE-REAR	D2132	1	SNA	
5.11-14	JC66-01424A	LEVER-LINK JAM	D2133	2	SNA	
5.11-15	6107-001237	SPRING-ES	D2134	1	SA	
5.11-16	JC61-01977A	HOLDER-JAM	D2135	2	SNA	
5.11-17	JC61-02156A	BRACKET-FUSER	D2136	1	SNA	
5.11-18	JC67-00254A	CAP-LAMP_R	D2137	1	SNA	
5.11-19	JC61-01625A	HOLDER-M_REAR_LEVER	D2138	1	SA	
5.11-20	6107-001267	SPRING-CS	Z4482	2	SA	
5.11-21	6107-001246	SPRING-CS	Z4602	2	SNA	
5.11-22	JC61-70903A	SPRING ETC-ACTUATOR	Z4132	1	SA	
5.11-23	JC61-02154A	GUIDE-CLAW	D2139	4	SNA	
5.11-24	JC61-01950A	SPRING ETC-CLAW	D2140	4	SA	
5.11-25	JC72-20902A	PEX-ROLLER F/UP(2)	O1106	5	SA	
5.11-26	JC70-20901A	IEX-SHAFT IDLE,F/UP	D2149	5	SA	
5.11-27	JC66-01584A	SHAFT-EXIT_F/UP	D2141	1	SNA	
5.11-28	JC61-02158A	BUSH-TX	D2142	3	SNA	
5.11-29	JC73-00259A	RUBBER-EXIT_F/UP	D2143	2	SNA	
5.11-30	JC66-01423A	ACTUATOR-EXIT	D2144	1	SNA	
5.11-31	JC75-00095A	MEC-BRUSH ANTISTATIC	M0022	1	SA	
5.11-32	JC70-00538A	ELECTRODE-EARTH	D2145	1	SNA	
5.11-33	JC66-01153A	GEAR-IDLE 23 FUSER	Z6116	2	SA	
5.11-34	JC61-01960A	BUSH-PR_1ST	D2146	2	SNA	
5.11-35	JC61-01961A	BUSH-PR_2ND	D2147	2	SNA	
5.11-36	6003-000269	SCREW-TAPTITE	Z4513	4	SA	
5.11-37	6003-000282	SCREW-TAPTITE	Z4517	5	SA	
5.11-38	6003-000196	SCREW-TAPTITE	Z4397	3	SA	
5.11-39	1404-001364	THERMISTOR-NTC ASSY	D2148	1	SA	
5.11-40	4712-001031	THERMOSTAT	D2129	1	SA	
5.11-41	4713-001207	LAMP-HALOGEN	D2130	1	SA	110V

Fuser Unit Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.11-41	4713-001208	LAMP-HALOGEN	D2130	1	SA	220V
5.11-42	JC39-00520A	CBF HARNESS-FUSER CON	D2131	1	SA	New
5.11-43	JC39-00609A	CBF HARNESS-FUSER R_2	D2135	1	SA	220V
5.11-43	JC39-00521A	CBF HARNESS-FUSER REC	D2149	1	SA	110V
5.11-44	6044-000231	RING-E	R0006	2	SA	
5.11-45	6044-000125	RING-E	R0004	4	SA	

5.12 Cassette Unit



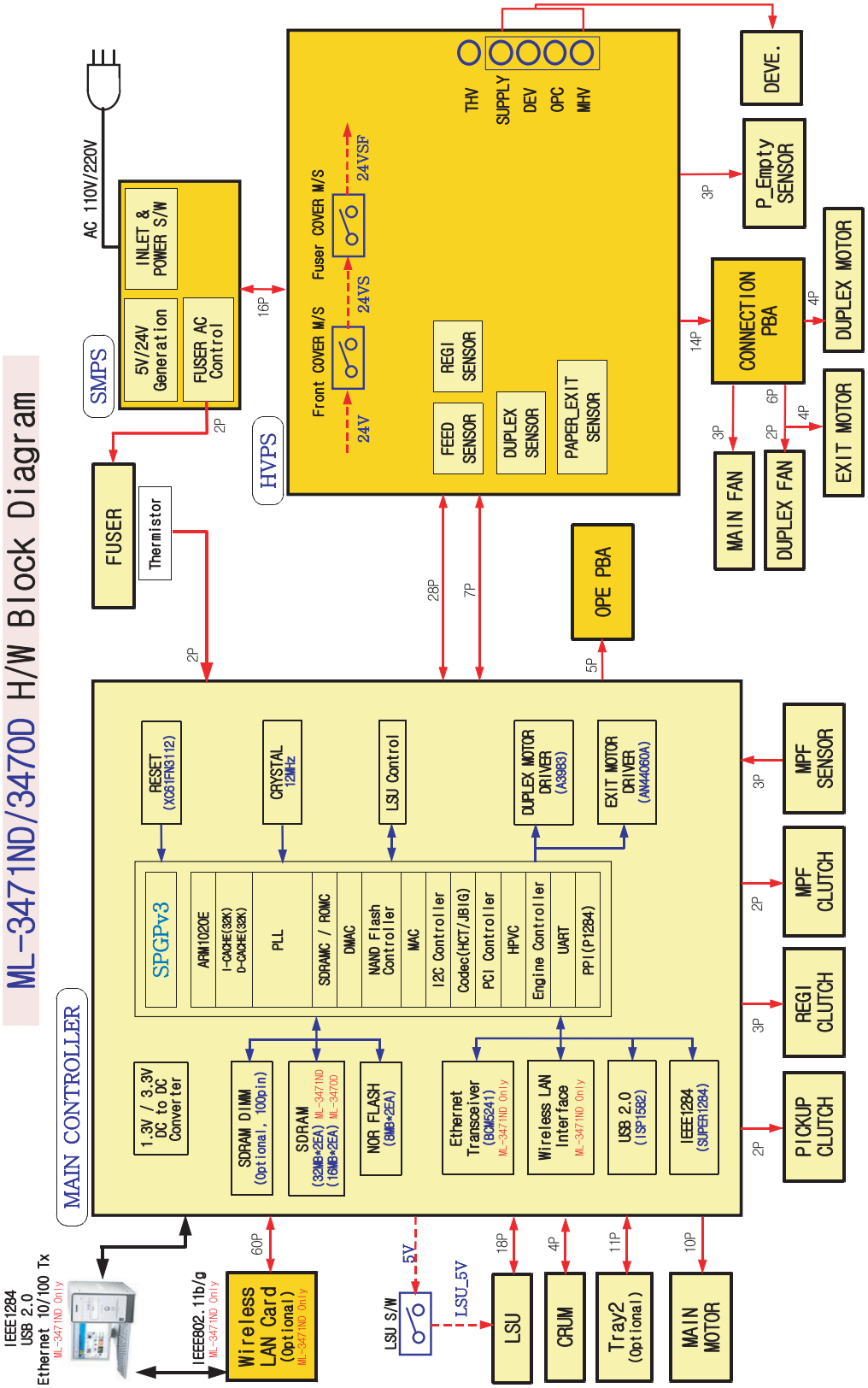
Cassette Unit Parts List

SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE

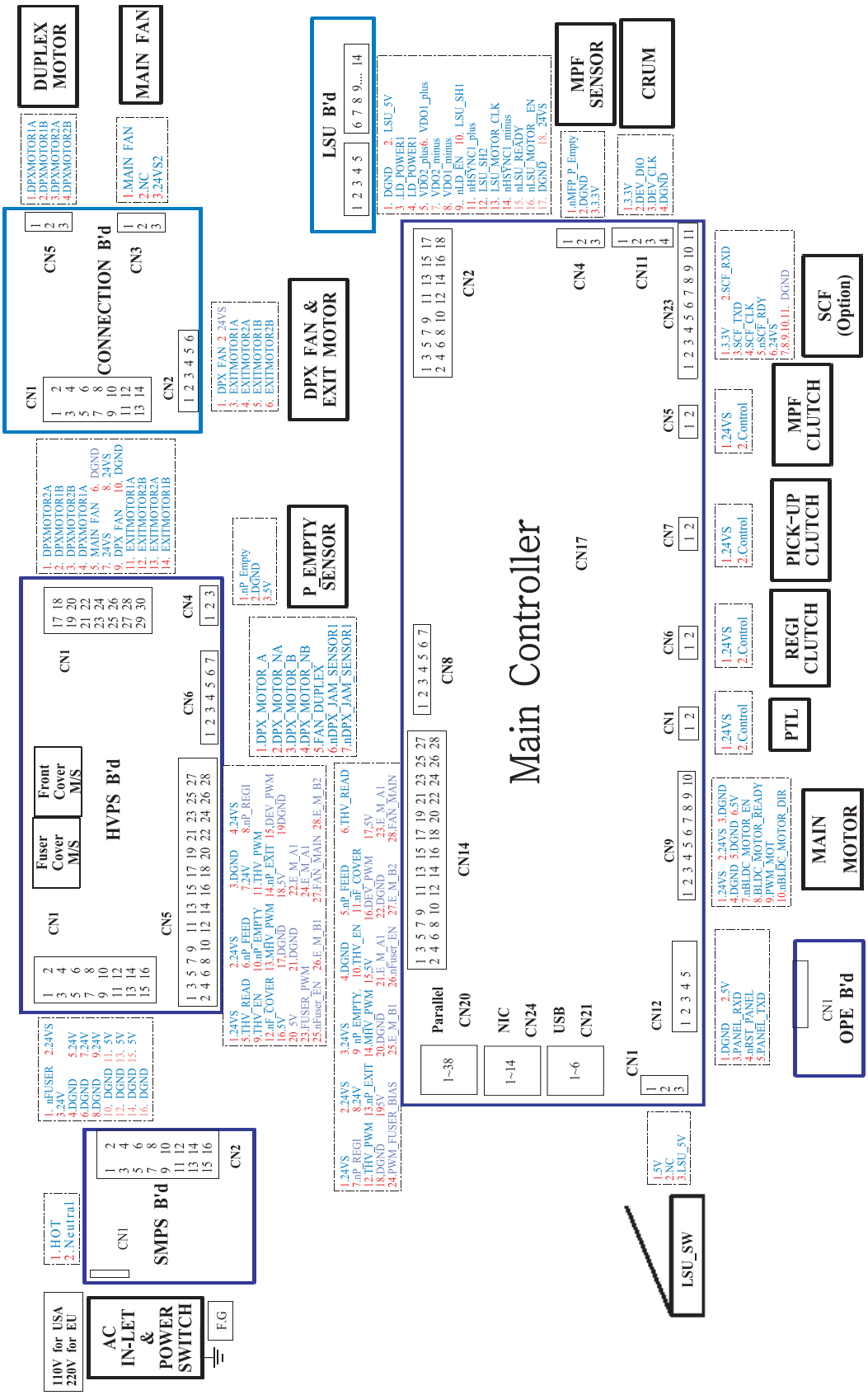
Drawer#	SEC_Code	Description	Location	QT'y	Service	Remark
5.12-0	JC97-02415A	MEA UNIT-CASSETTE	D2106	1	SA	
5.12-1	JC70-00300A	ADJUST-M-CASSETTE_L	K2014	1	SA	
5.12-2	JC70-00301A	ADJUST-M-CASSETTE_R	K2015	1	SA	
5.12-3	JG66-40003A	GEAR-PINION	G0035	1	SA	
5.12-4	JC97-01931A	MEA UNIT-HOLDER PAD		1	SA	
5.12-4-1	JC61-00580A	HOLDER-M-PAD		1	SA	
5.12-4-2	JC63-00407A	SHEET-HOLDER PAD R2		1	SNA	
5.12-4-3	JC70-00314A	IPR-PLATE PAD	P0009	1	SA	
5.12-4-4	JC73-00140A	RPR-FRICTION PAD	P0034	1	SA	
5.12-5	JC61-70911A	SPRING ETC-EXIT ROLL FD	O1053	1	SA	
5.12-6	JC61-00603A	PLATE-P-KNOCK_UP		1	SNA	
5.12-7	6107-001166	SPRING-CS	Z4199	2	SA	
5.12-7	JC73-00141A	RPR-PAD CASSETTE	R0020	1	SA	
5.12-8	JC66-00719A	CAM-M-KNOCK UP		1	SA	
5.12-9	JC61-00876A	FRAME-M_CASSETTE		1	SNA	
5.12-10	JC61-00918B	GUIDE-M-EXTENSION L2	E5013	1	SA	
5.12-11	JC72-00971A	PMO-EXTENSION SMALL	E5014	1	SA	
5.12-12	JC72-00972A	PMO-PLATE_LOCKER	L6051	1	SA	
5.12-13	JG61-70531A	SPRING ETC-LOCKER,PLATE	S0025	1	SA	
5.12-14	JC63-00974A	COVER-M_SUB CST		1	SNA	
5.12-15	JC64-00253A	INDICATOR-M_CASSETTE		1	SNA	
Replacement	JC69-00914B	BOX-MAIN		1	SA	

6. System Diagram

6.1 Block Diagram



6.2 Connection Diagram



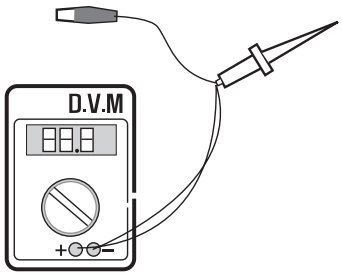
7. Reference Information

This chapter describes the reference information for applying this training manual, and it is consist-ed of the tool list, the abbreviation table, the outline of model, and so on.

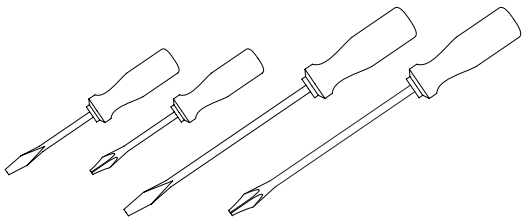
7.1 Troubleshooting Tool

The following tools are recommended safe and easy troubleshooting as described in this service manual.

- **DVM(Digital Volt Meter)**
  Standard : Indicates more than 3 digits.



- **Driver**
  Standard : "-" type, "+" type (M3 long, M3 short, M2 long, M2 short).

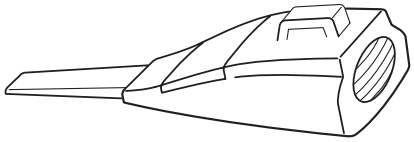


- **Tweezers**
  Standard : For general home use, small type.

- **Cotton Swab**
  Standard : For general home use, for medical service.

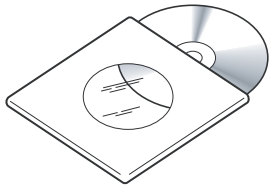
- **Cleaning Equipments**
  Standard : An IPA(Isopropyl Alcohol)dry wipe tissue or a gentle neutral detergent and lint-free cloth.

- **Vacuum Cleaner**



- **Spring Hook**
  Standard : For general use

- **Software (Driver) installation CD ROM**



7.2 Acronyms and Abbreviations(1)

The table below explains the abbreviations and acronyms used in this service manual. Where abbreviations or acronyms are used in the text please refer to this table.

Abbreviations	Explanation
AP	Access Point
AC	Alternating Current
APC	Auto Power Control
ASIC	Application Specific Integrated Circuit
ASSY	assembly
BIOS	Basic Input Output System
BLDC	Brush-less Direct Current
CMOS	Complementary Metal Oxide Semiconductor
CN	connector
CON	connector
CPU	Central Processing Unit
dB	decibel
dbA	decibel A
dBM	decibel milliwatt
DC	direct current
DCU	Diagnostic Control Unit
DPI	Dot Per Inch
DRAM	Dynamic Random Access Memory
DVM	Digital Voltmeter
ECP	Enhanced Capability Port
EDC	Embedded Diagnostic control
EEPROM	Electronically Erasable Programmable Read Only Memory
EMI	Electro Magnetic Interference
EP	electrophotographic
EPP	Enhanced Parallel Port
FPOT	First Printout Time
F/W	firmware
GDI	graphics device interface
GND	ground
HBP	Host Based Printing
HDD	Hard Disk Drive
H/H	High temperature and high marshy place
HV	high voltage
HVPS	High Voltage Power Supply
I/F	interface
I/O	Input and Output
IC	integrated circuit
IDE	Intelligent Drive electronics or Imbedded Drive Electronics

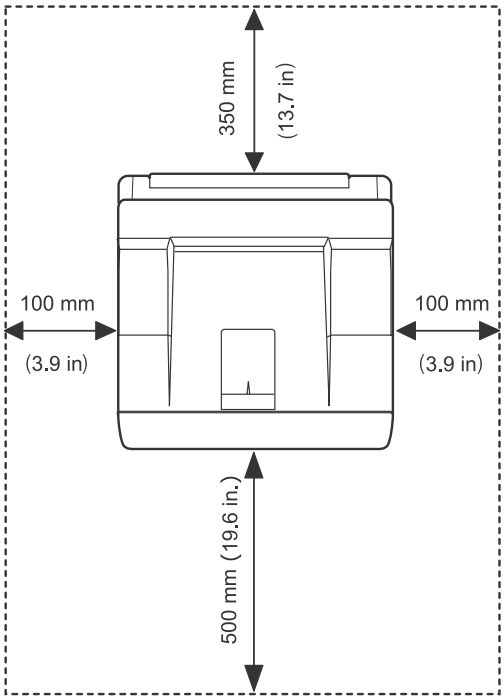
Acronyms and Abbreviations(2)

Abbreviations	Explanation
IEEE	Institute of Electrical and Electronics Engineers. Inc
IPA	Isopropy Alcohol
IPM	Images Per Minute
LAN	local area network
lb	pound(s)
LBP	Laser Beam Printer
LCD	Liquid Crystal Display
LED	Light Emitting Diode
L/L	Low temperature and low marshy place
LSU	Laser Scanning Unit
MB	megabyte
MHz	megahertz
MPF	Multi Purpose Feeder
NIC	Network Interface Card
N/N	Normal temperature and normal marshy place
NVRAM	nonvolatile random access memory
OPC	Organic Photo Conductor
OPE	Operate Panel Equipment
PBA	Printed Board Assembly
PCL	Printer Command Language , Printer Control Language
PDL	Page Discription Language
PPM	Page Per Minute
PPS	Pulse Per Second
PS	Post Script
PTL	Pre-Transfer Lamp
PWM	Pulse Width Modulation
Q-PID	Quick Printer Initiating Device
Q'ty	quantity
RAM	Random Access Memory
ROM	Read Only Memory
SCF	Second Cassette Feeder
SMPS	Switching Mode Power Supply
SPGP	Samsung Printer Graphic Processor
SPL	Samsung Printer Language
Spool	Simultaneous Peripheral Operation Online
SW	switch
sync	synchronous or synchronization
USB	Universal Serial Bus
WECA	Wireless Ethernet Compatibility Alliance

7.3 Selecting printer locations

• Leave enough room to open the printer trays, covers, and allow for proper ventilation. (see diagram below)

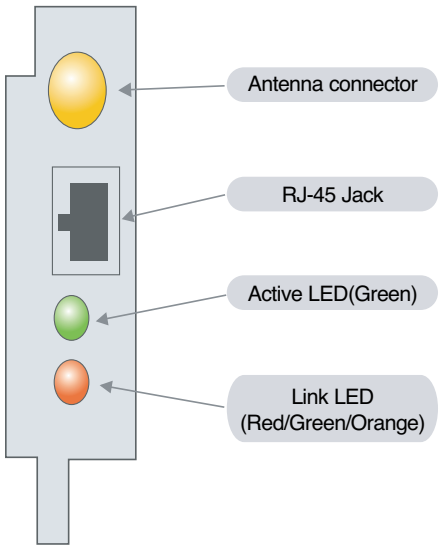
• Provide the proper environment :
- A firm, level surface
- Away from the direct airflow of air conditioners, heaters, or ventilators
- Free of extreme fluctuations of temperature, sunlight, or humidity
- Clean, dry, and free of dust



7.4 LAN (Optional Function)

• This product can be used with a wired LAN (Option)

• LED Condition and Status



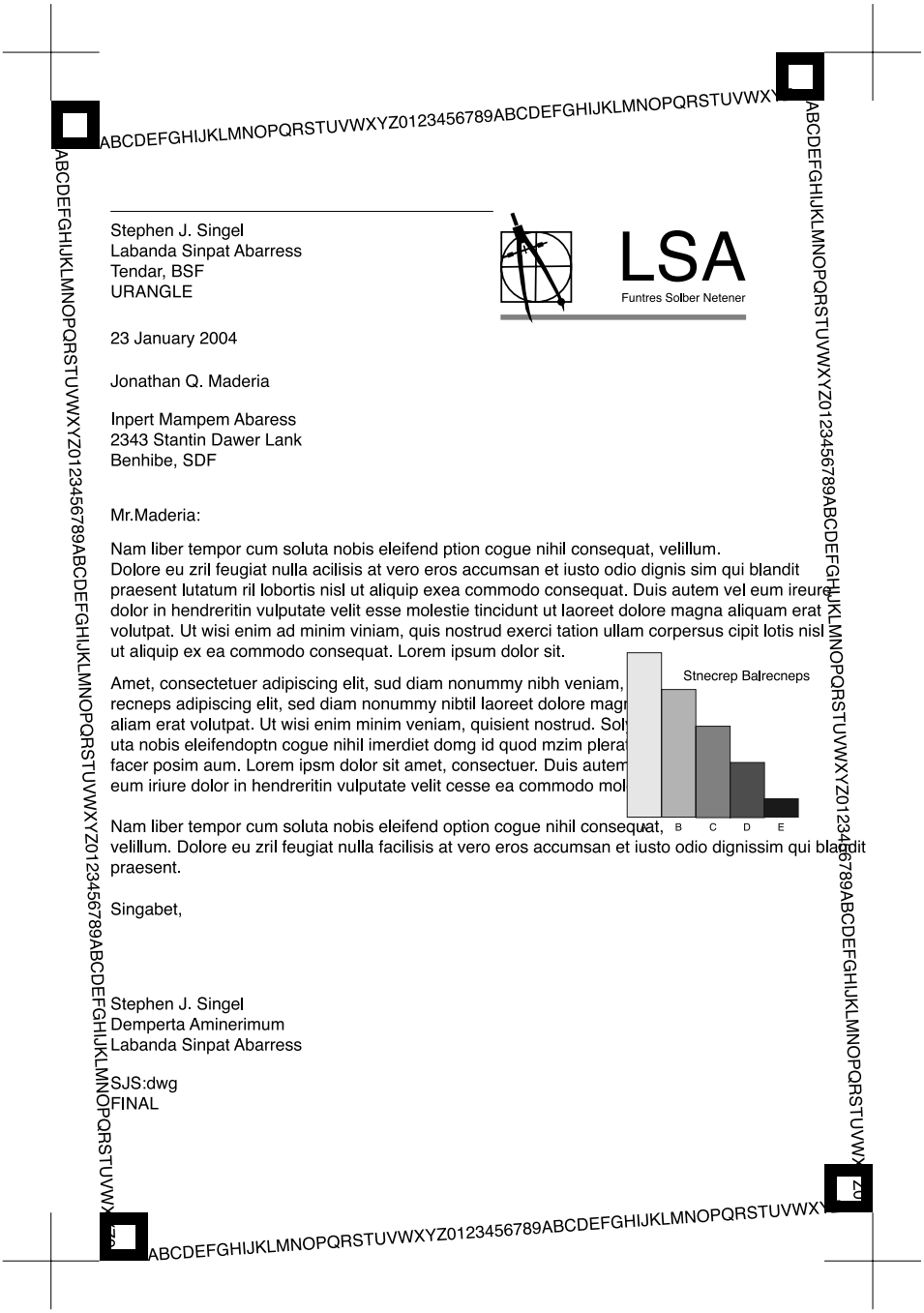
[LED STATUS]

LED Condition	Status
Active LED random blink	Normal NPC &Normal packet receive
Active LED regular blink	Normal NPC &No Packet
Active LED Off/On maintenance	NPC Initial inferiority
Link LED On	The link LED On OPC,Normally linked (Red:Wireless,Green:Wire,Orange:Wire)
Link LED Off	Link LED off NPC,Link Inferiority

7.5 Sample Tests Patterns

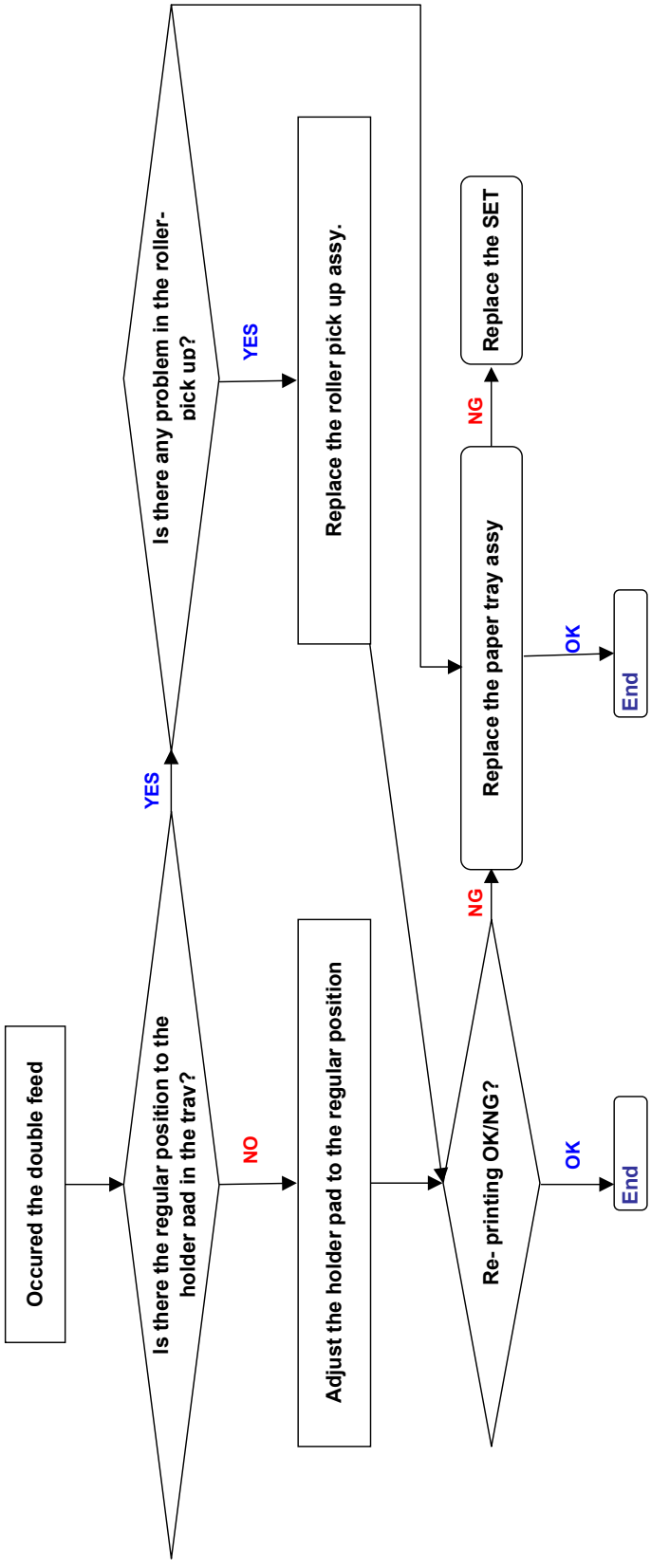
The sample patterns shown below are the standard test patterns used in the factory.
The life of the toner cartridge, developer cartridge and printing speed are measured with the pattern shown below (5%). The A4 ISO 19752 standard pattern samples are reproduced reduced to 70% of the actual A4 size.

A4 ISO 19752 Standard Patterns

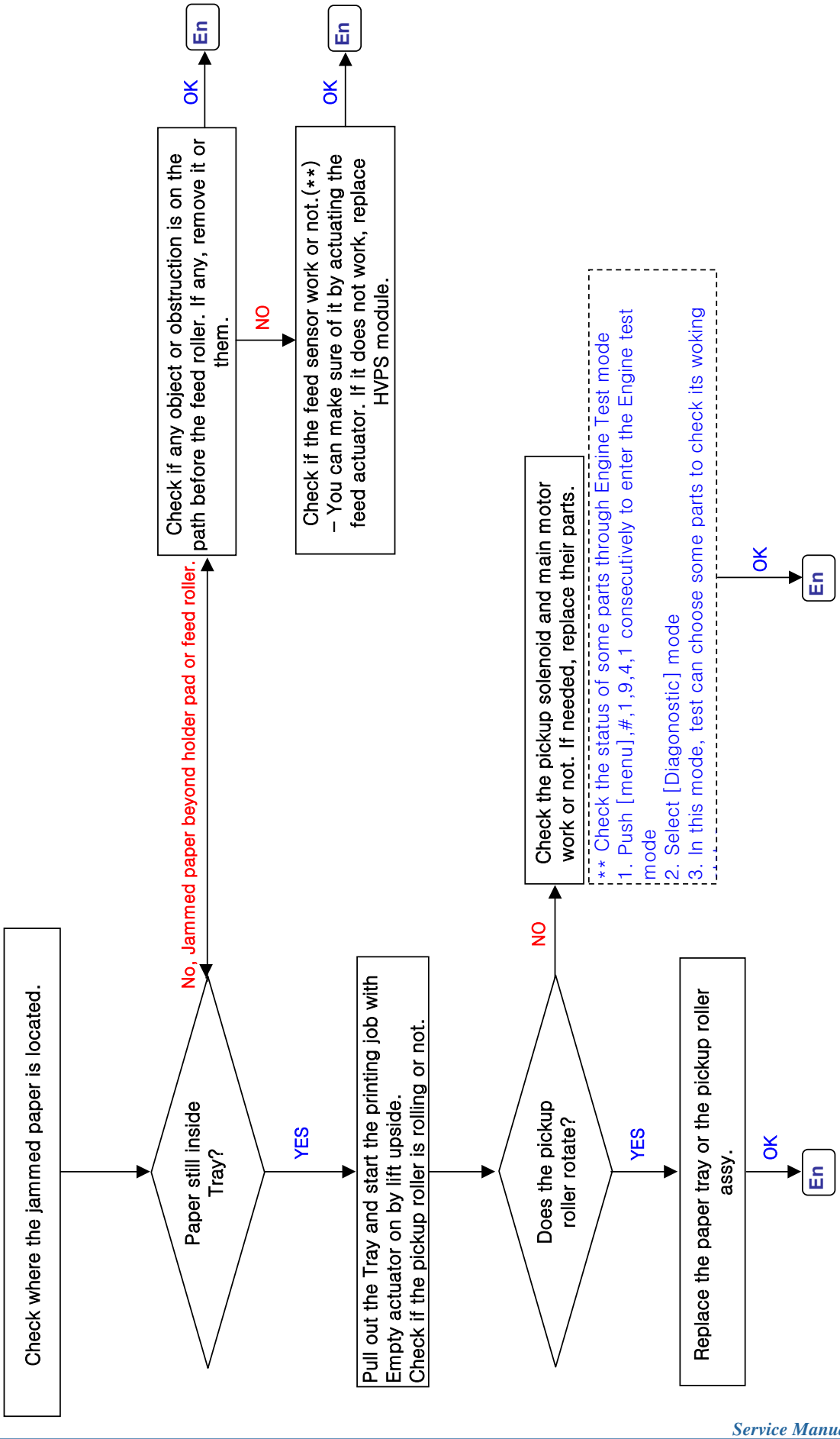


7.6 Series model solution(ML-3470D and ML-3471ND)

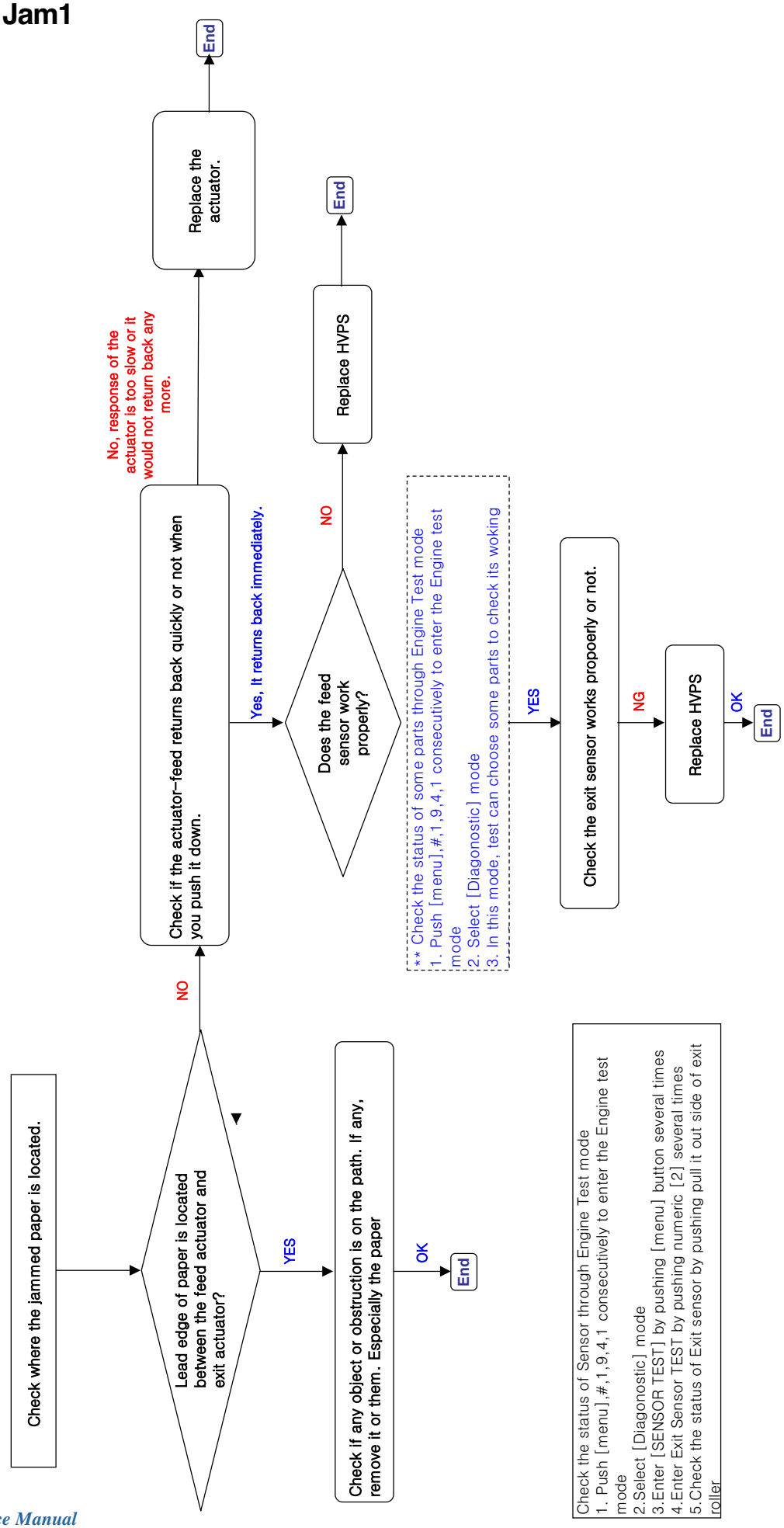
7.6.1 Double Feed Error



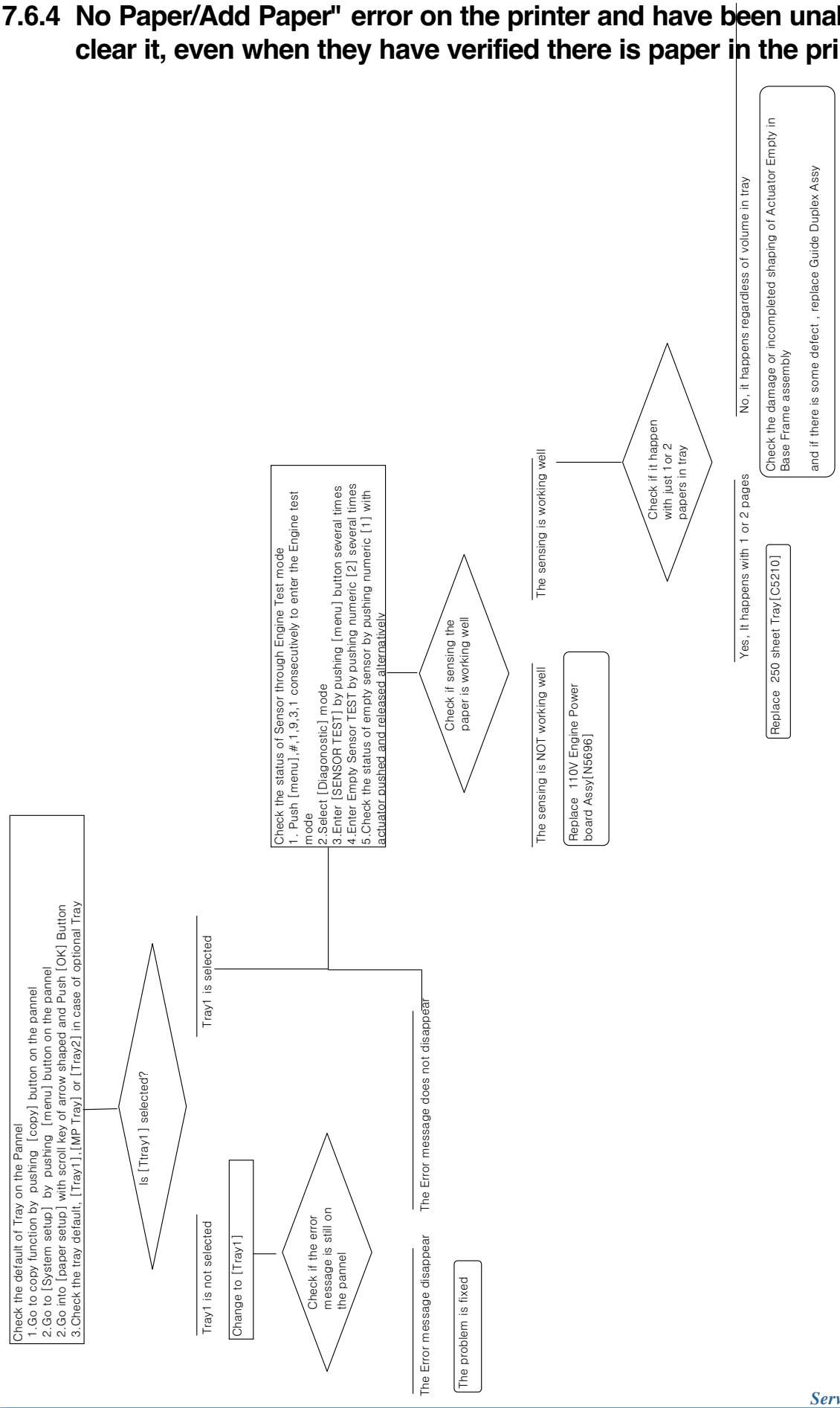
7.6.2 Jam0


Check where the jammed paper is located.
Paper still inside Tray?
No, Jammed paper beyond holder pad or feed roller.
YES
Pull out the Tray and start the printing job with Empty actuator on by lift upside.
Check if the pickup roller is rolling or not.
Does the pickup roller rotate?
NO
Check the pickup solenoid and main motor work or not. If needed, replace their parts.
** Check the status of some parts through Engine Test mode
1. Push [menu],#,1,9,4,1 consecutively to enter the Engine test mode
2. Select [Diagonostic] mode
3. In this mode, test can choose some parts to check its woking
OK
En
YES
Replace the paper tray or the pickup roller assy.
OK
En
Check if any object or obstruction is on the path before the feed roller. If any, remove it or them.
OK
En
NO
Check if the feed sensor work or not.(**)
– You can make sure of it by actuating the feed actuator. If it does not work, replace HVPS module.
OK
En

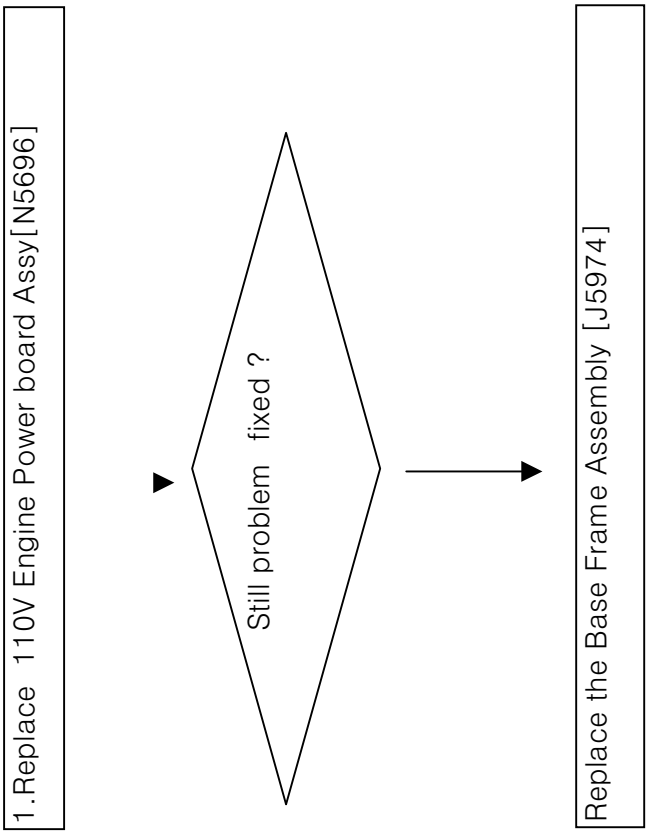
7.6.3 Jam1


Check where the jammed paper is located.
Lead edge of paper is located between the feed actuator and exit actuator?
NO
YES
Check if any object or obstruction is on the path. If any, remove it or them. Especially the paper
OK
End
Check if the actuator-feed returns back quickly or not when you push it down.
No, response of the actuator is too slow or it would not return back any more.
Replace the actuator.
End
Yes, It returns back immediately.
Does the feed sensor work properly?
NO
Replace HVPS
End
** Check the status of some parts through Engine Test mode
1. Push [menu],#,1,9,4,1 consecutively to enter the Engine test mode
2. Select [Diagonostic] mode
3. In this mode, test can choose some parts to check its woking
YES
Check the exit sensor works propoerly or not.
NG
Replace HVPS
OK
End
Check the status of Sensor through Engine Test mode
1. Push [menu],#,1,9,4,1 consecutively to enter the Engine test mode
2.Select [Diagonostic] mode
3.Enter [SENSOR TEST] by pushing [menu] button several times
4.Enter Exit Sensor TEST by pushing numeric [2] several times
5.Check the status of Exit sensor by pushing pull it out side of exit roller

7.6.4 No Paper/Add Paper" error on the printer and have been unable to clear it, even when they have verified there is paper in the printer



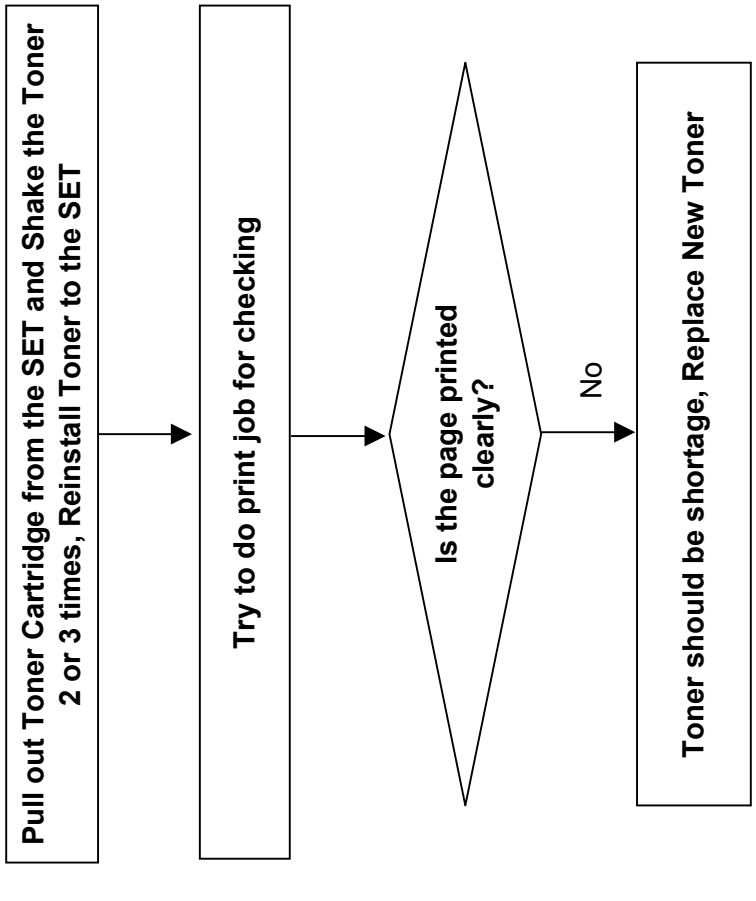
7.6.5 Open Cover Error



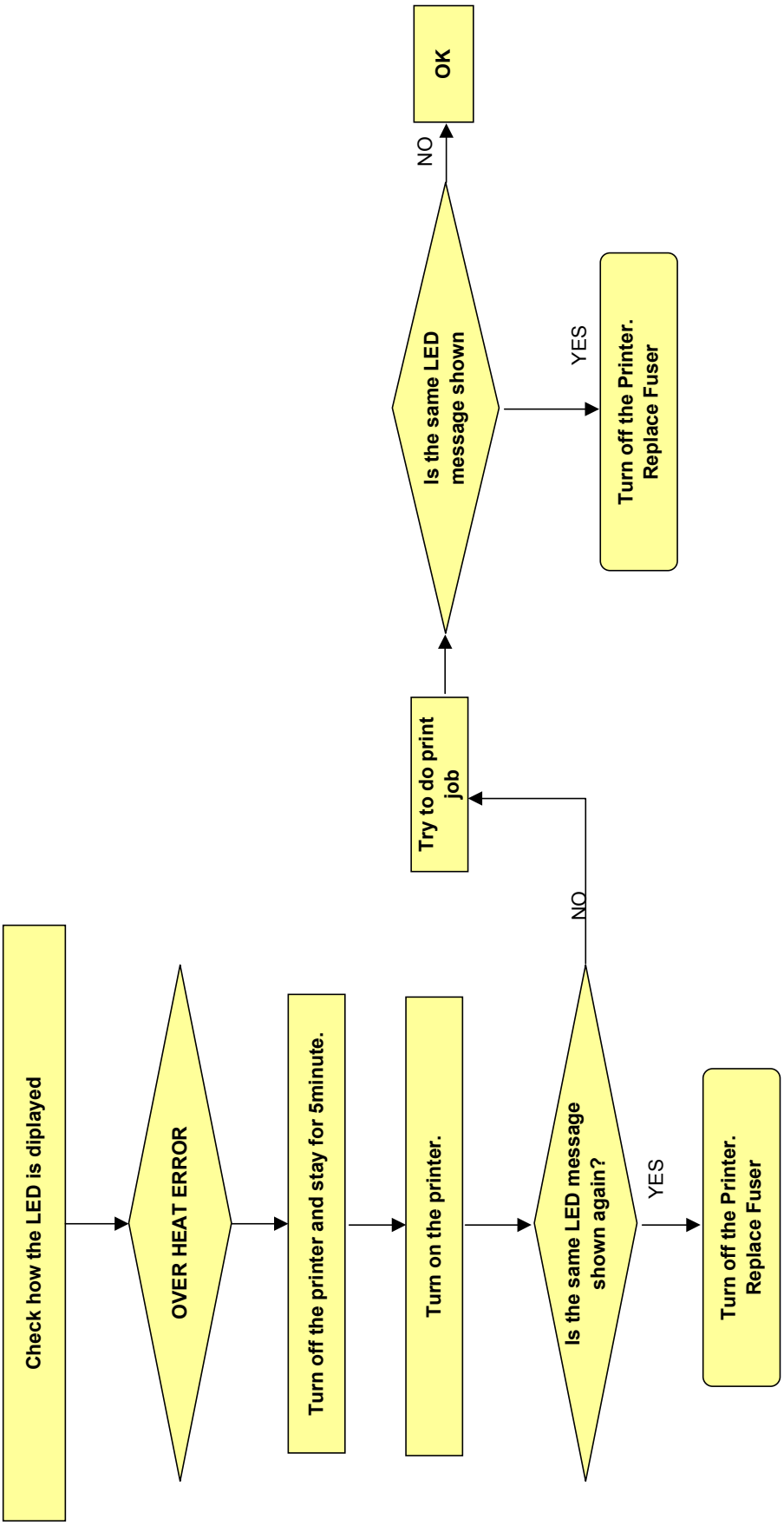
7.6.6 Low Toner

solid ORANGE Led

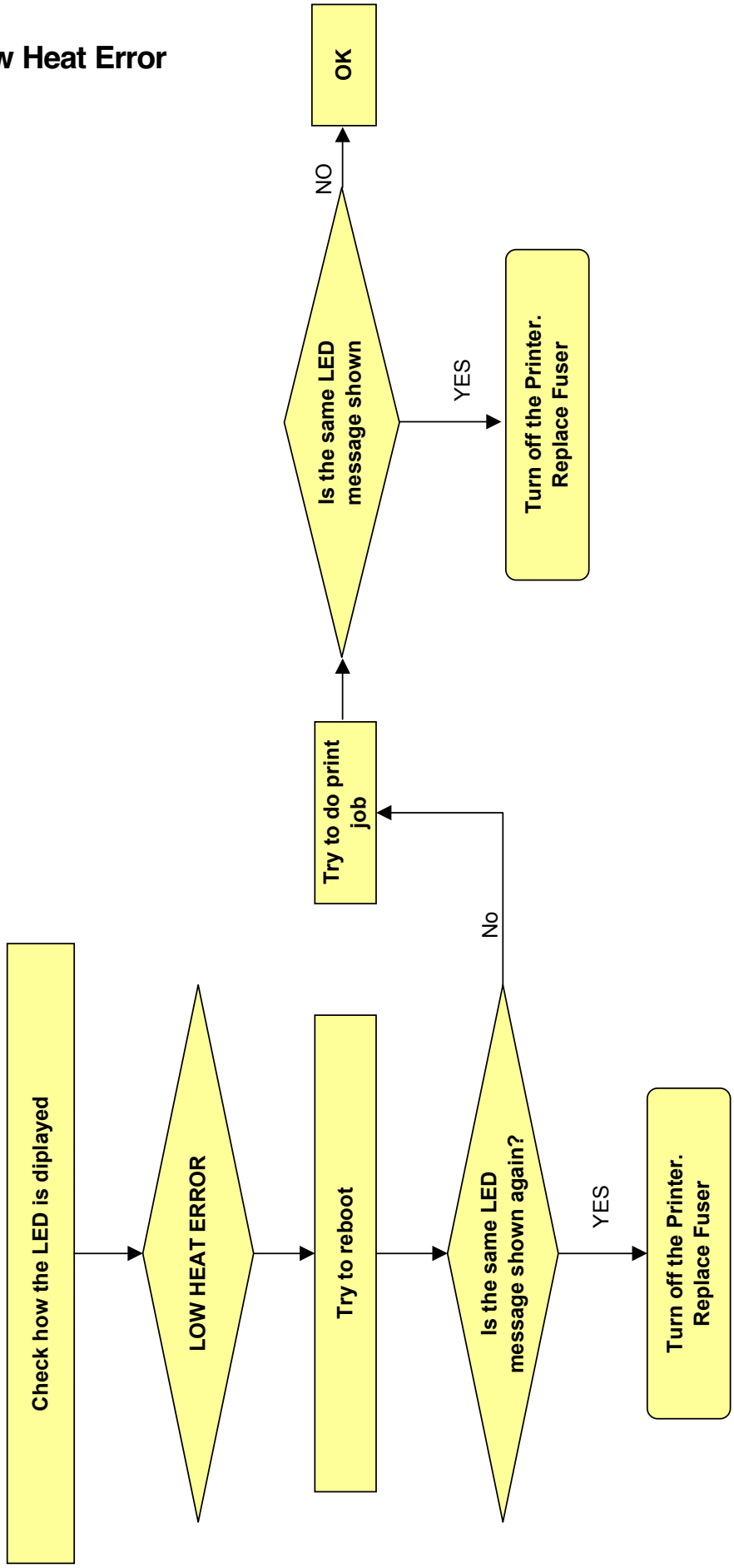
: The solid Orange Error LED is on, which means toner low status.



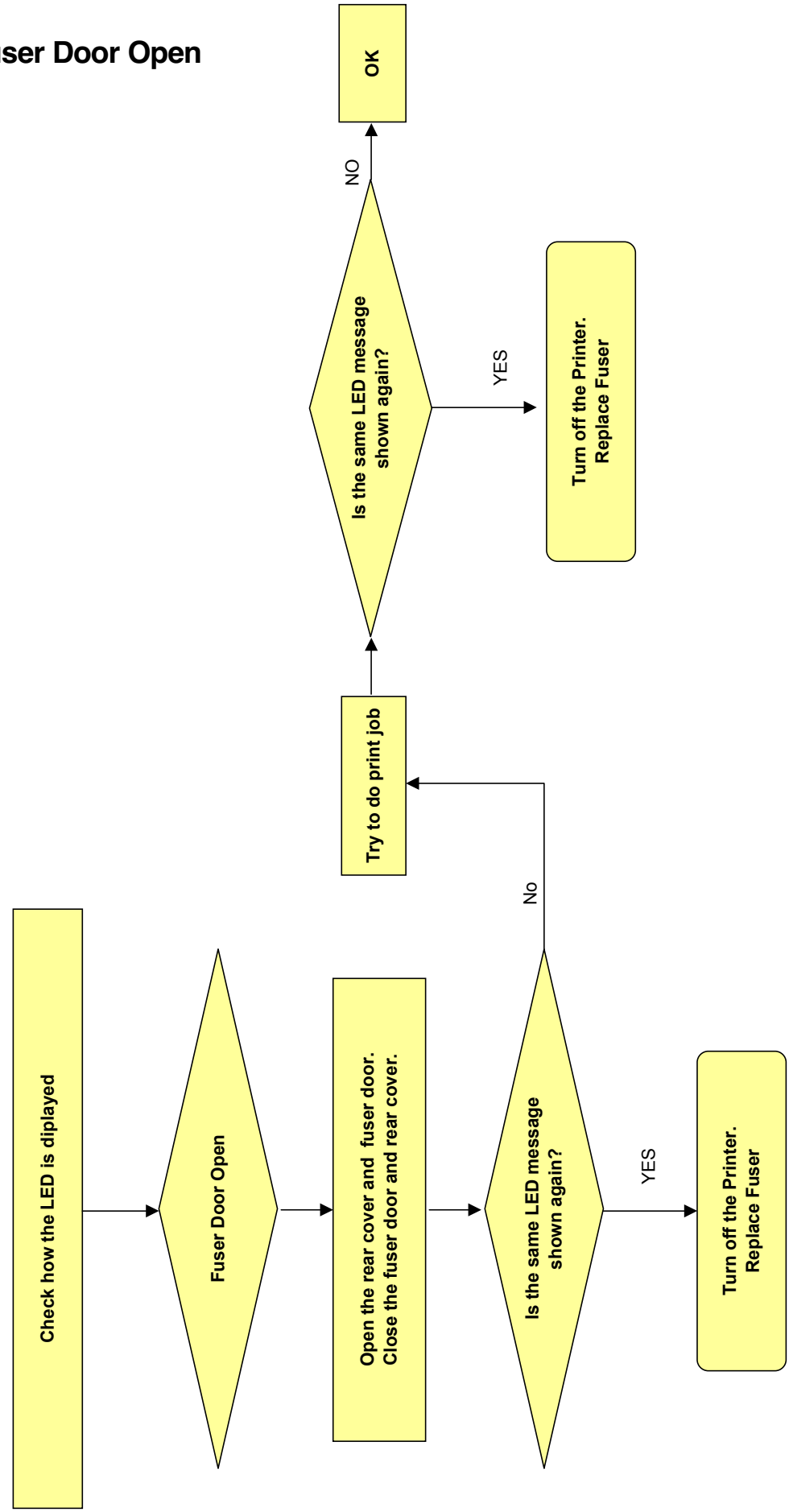
7.6.7 Over Heat Error



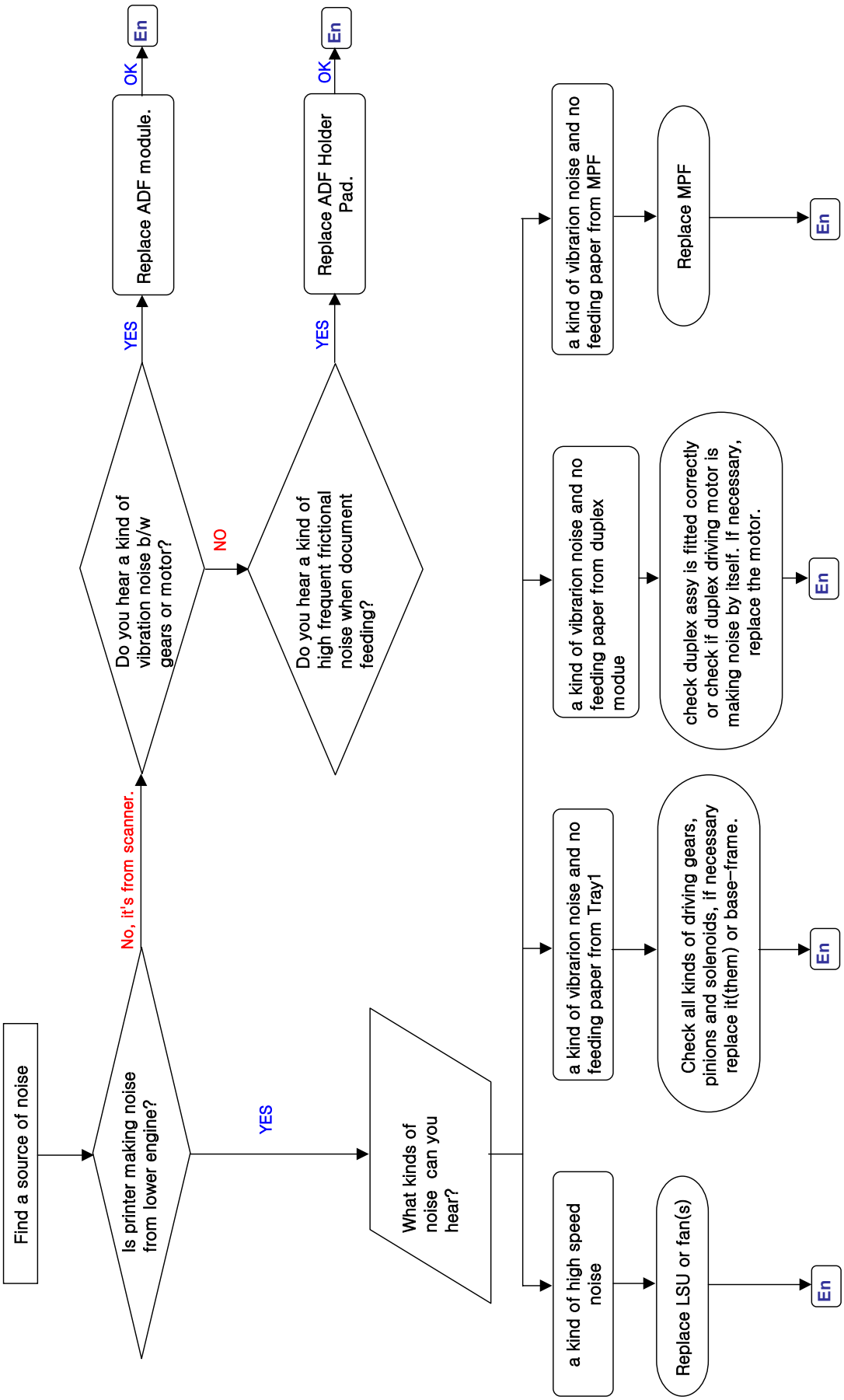
7.6.8 Low Heat Error



7.6.9 Fuser Door Open

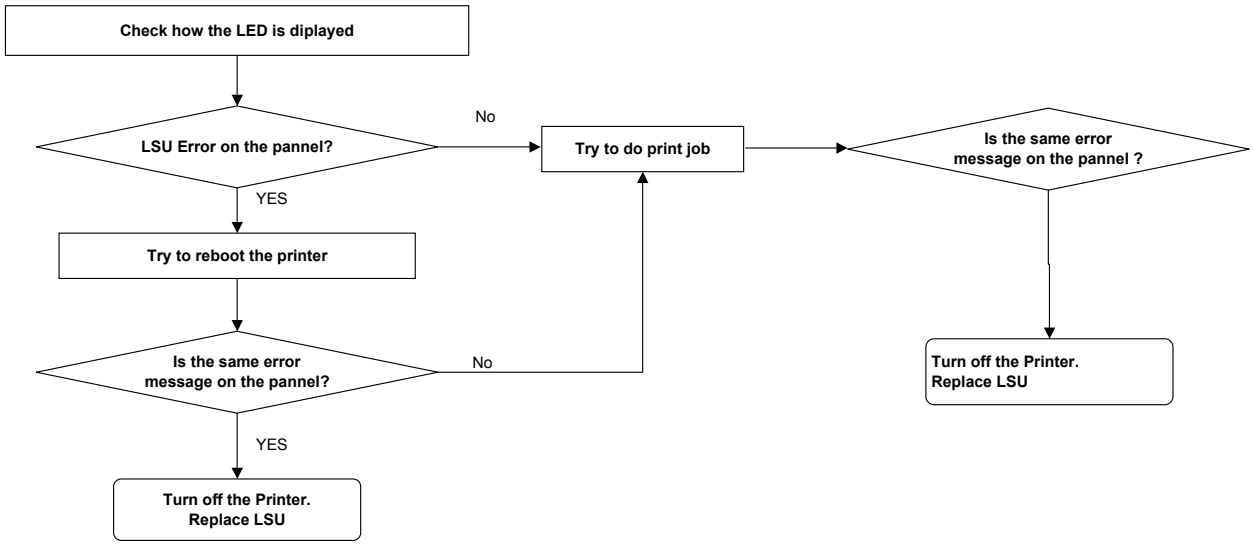


7.6.10 A noise troubleshooting tree

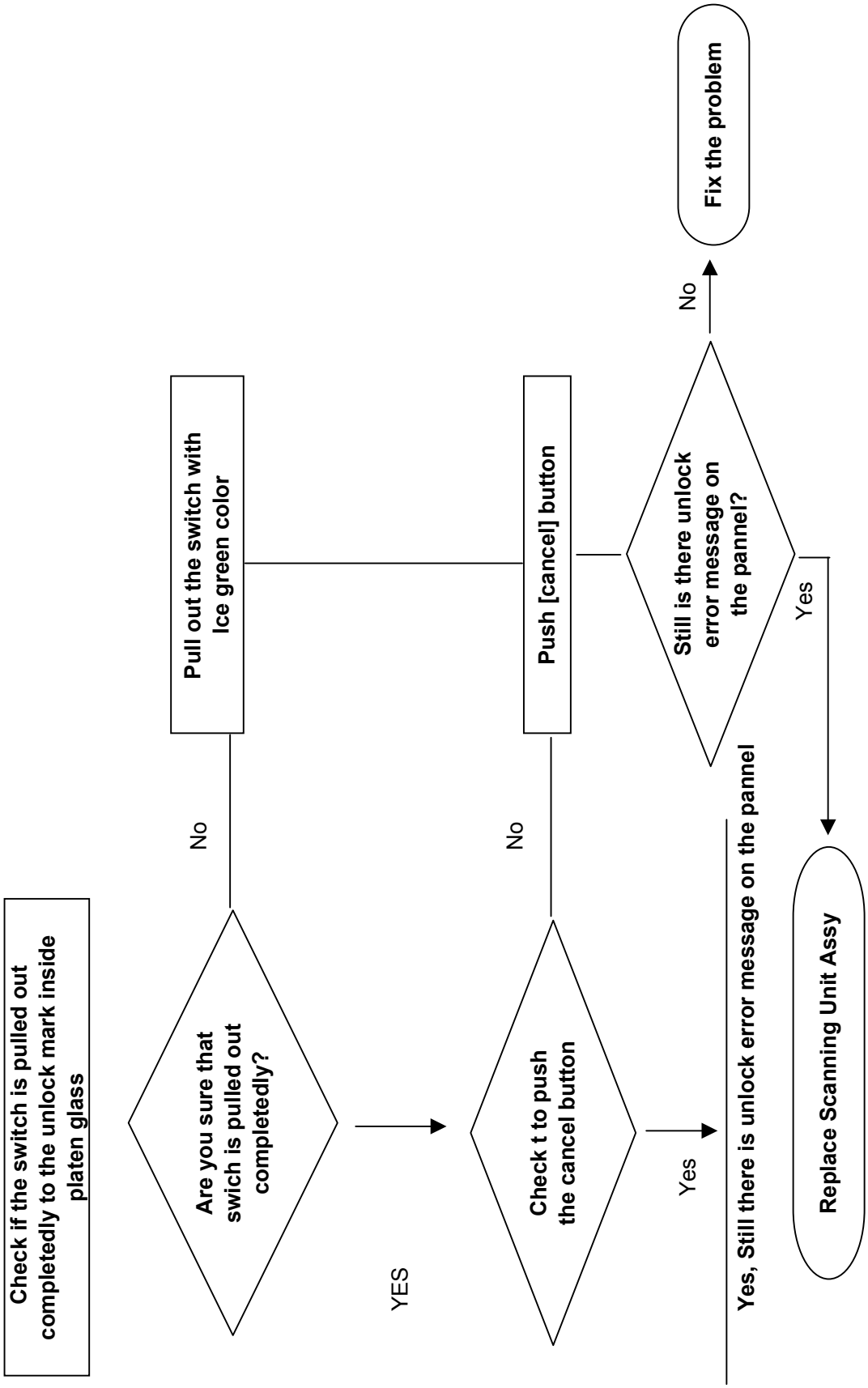


7.6.11 LSU Error

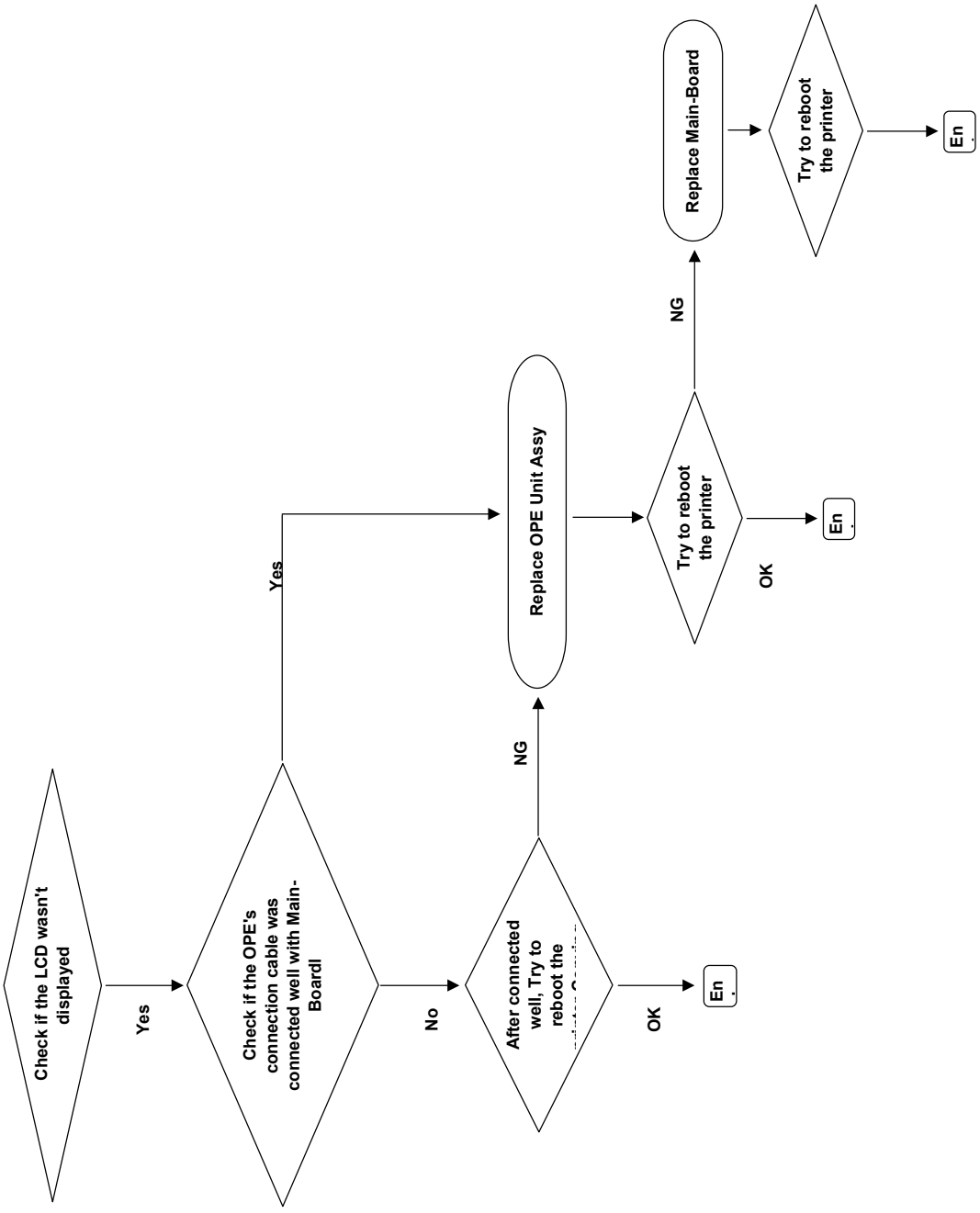
: The ERROR and Online LED are blinking together



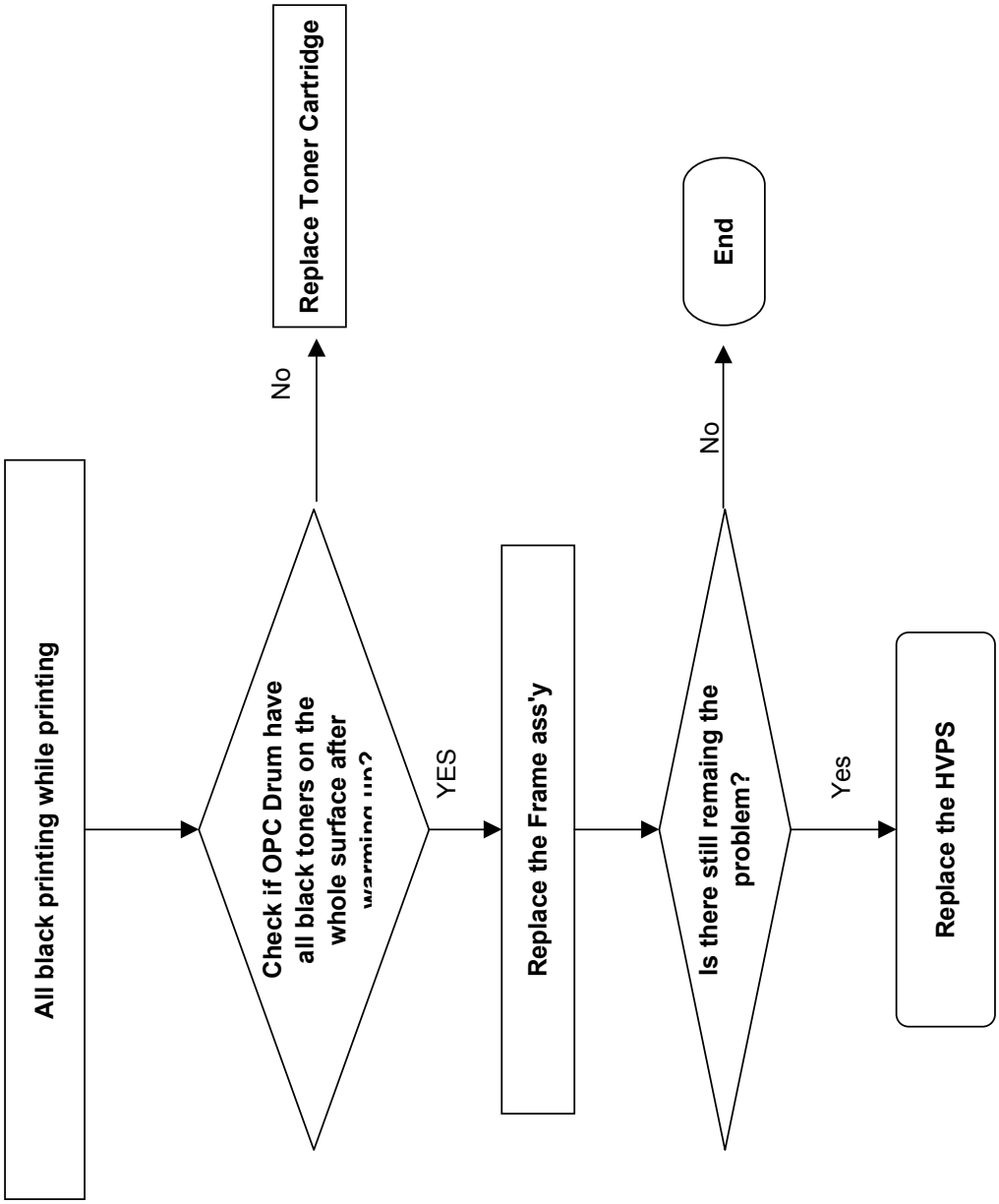
7.6.12 Scan Lock Error



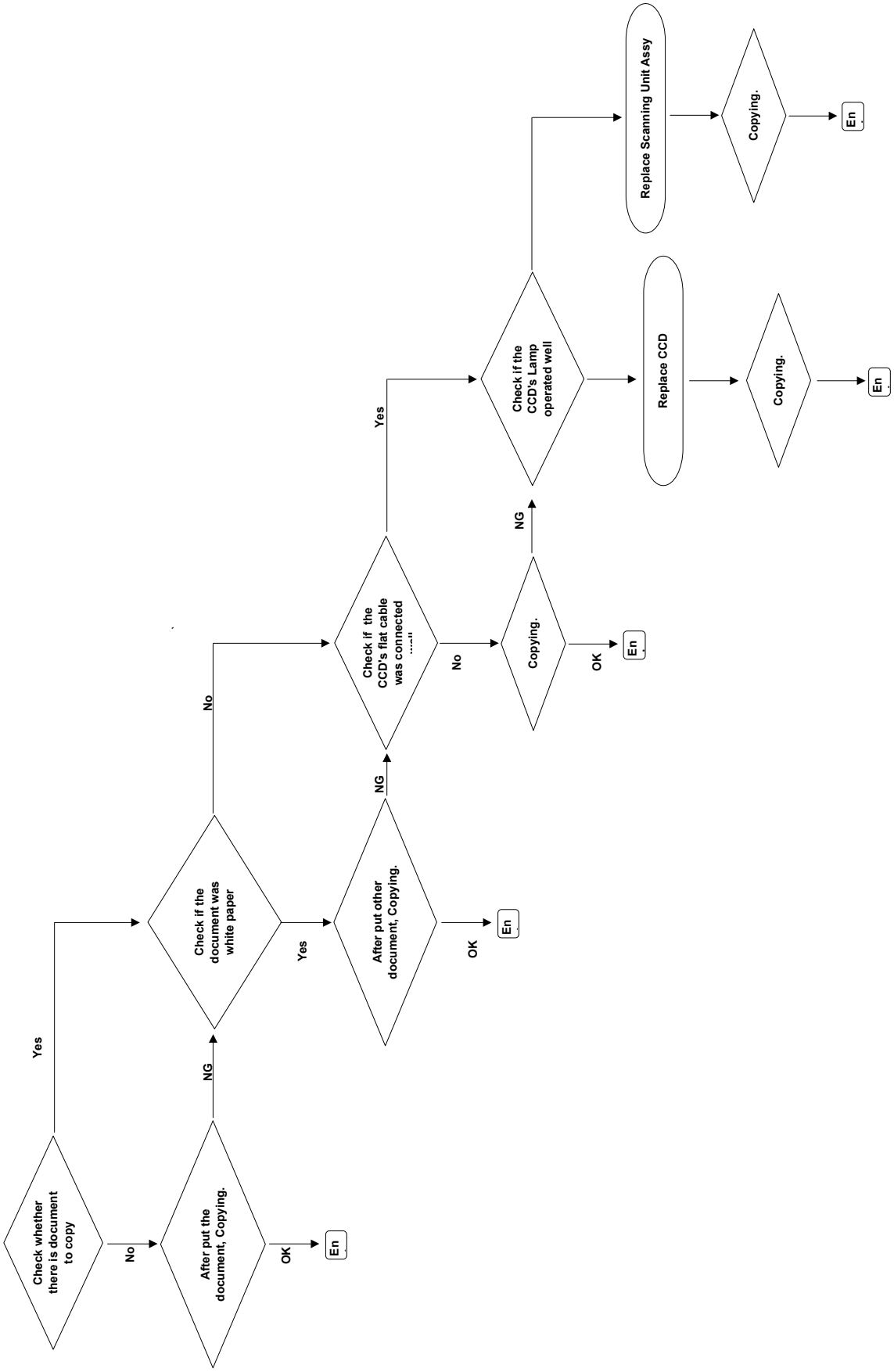
7.6.13 Nothing Displayed on LCD



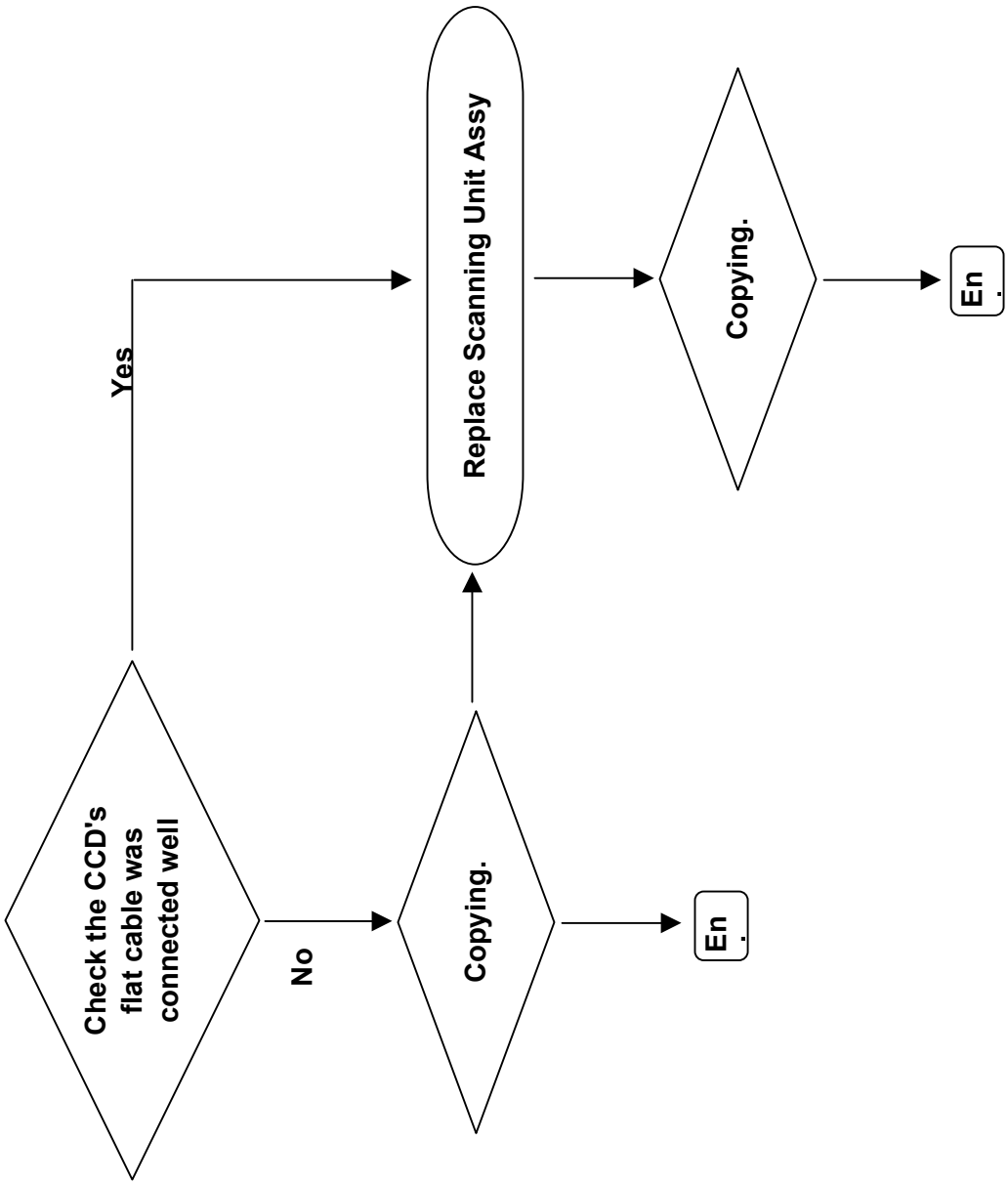
7.6.14 All black printing



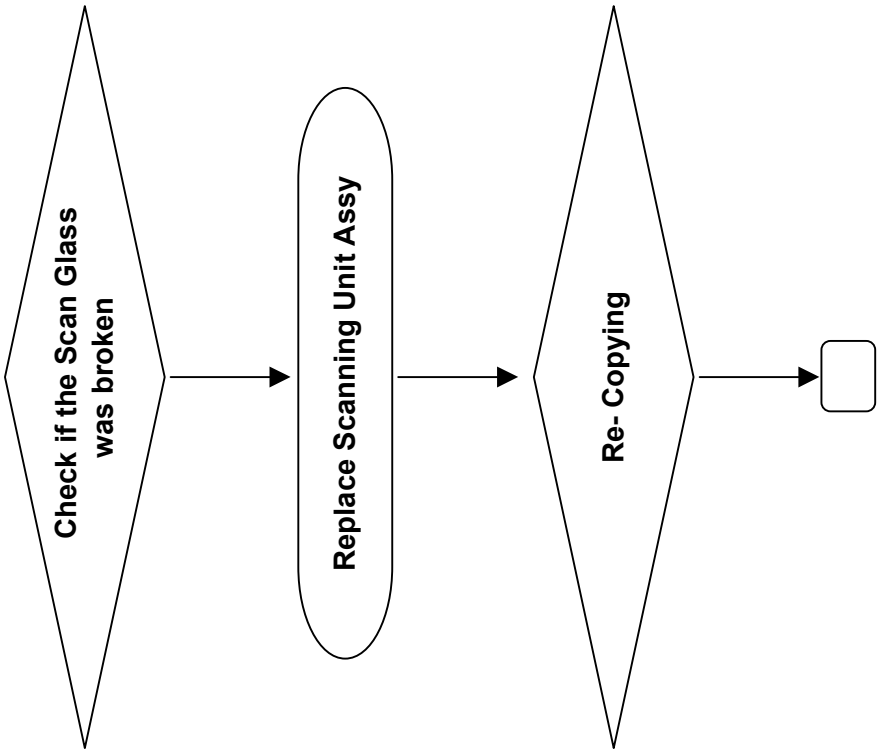
7.6.15 Blank Copy



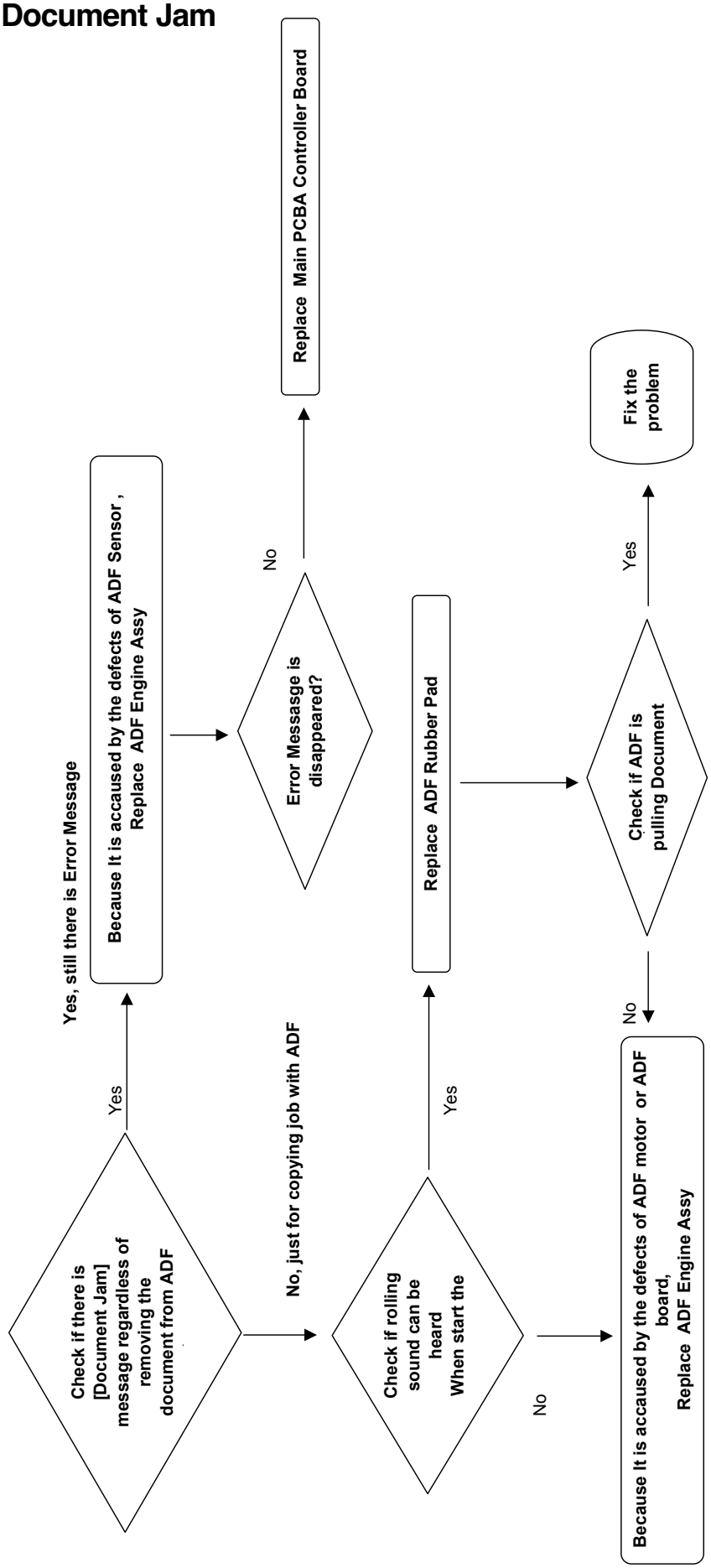
7.6.16 Images at 1 Copy



7.6.17 Glass Broken



7.6.18 Document Jam



7.7 Parts Life Cycle Maintenance Table

7.7.1 Parts Life Cycle Maintenance Table

Supplies	Life Cycle	Condition	Engine Codition	LCD Indication	Custmoer Panel Manage	Responding
Toner Cartridge	4K : For Product 10K : For Sale	Toner Low	Warning	Ready Low Toner	-	10% Remains
		Toner Empty	Warning	Ready Toner	-	Initialized at toner change
		Toner uninstalled				
Fuser	80K(page) : Simplex	Exhauseted	No Indication	No Indication	Replaced at Exhauseted	
Transer Roller	70K(page) : Simplex	Exhauseted	No Indication	No Indication	Replaced at Exhauseted	
PickUP Roller	150K(page) : Simplex	Exhauseted	No Indication	No Indication	Replaced at Exhauseted	

7.7.2 Toner Cartridge Criterion

1) Supplies Criterion (Toner Cartridge)

1. Cartridge Main Defects
   - White Point, Black Point : White or Black point on printing image
   - Image contamination : Dirty printing image
   - Image Fainted : Entire Image is fainted and vertical white line emerge

   - Black Line : Vertical black line emerge on printing image

2) Defect Symptoms

Symptoms	Criterion	Remarks
White, Black Point	Clean Up OPC (10 times), if disappeared, no failure. - If continuous, failure	System Setup -> Maintenance-> Clean Drum
Image contamination (Toner leakage)	Drity printing image or conteminated reverse side - Clean up OPC (10 times) and inside of machine with cloth, if disappeared, no failure.	
Image Fainted	After shake cartridge right and left 5~6 times, if printing image is not fainted, no failure. (Toner Exhausted)	
Vertical Black Line	Vertical thin line emerge, if cartridge is scratched. - (Customer fault)	

7.8 Model Information

7.8.1 Model List

Model Name	classification	Information
ML-3471NDK	Basic Model (PCL+Duplex+Network)	33PPM Mono Laser Printer, PCL6, PS3
ML-3470DK	Network Eliminated Model(PCL+Duplex)	
ML-3471NDKG	Network model for business selling (PCL+Duplex+Network)	
ML-3470DKG	Netwrork eliminated model for business selling(PCL+Duplex)	
ML-3470A	4K Toner Cartridge	Initially installed
ML-3470B	10K Toner Cartridge	Installed for sales

7.8.2 Understanding for Model Code

Model code is inscribed and managed by product standard operation.
If understand the standard operation. It will help to comprehend basic and derived model.

Classification	Model abbriviation				Feature/Properties					
DIGIT	1	2	3	4	5	6	7	8	9	10
Example	M	L		-	3	4	7	1	N	D
Definition	Product Classification		Color Product		1. Speed of Engine - If same speed models are released simultaneously higher model is added +1 at speed code. - If over 10 models with same speed are brought into, tenth model is added +1. 2. Domestic Entry Model Distribution - C&C : Engine speed - Information : The first number deleted		1.New model, series model division - Over 3rd grade project 2.Valuablet model division in market despite of not over 3rd grade - VE model, etc. (Valuable model is decided byproduct planning group with sales prospect)	1. Basic : 0 2.Series model division - Below 4th grade project .PC Bundle .Domestic distribution (Entry model excepted)	Main feature description - N : N/W - P : PS - S : N/W+PS - B : Bluetooth - T : 2nd CST - M : Mac Compatible - X : Scanner . Beside abovefeature description, product conception to product planning group responsed	Space (Basic:Omitted)
Code Description	Printer Class of Product Description : M	Laser Beginning letter of printer Description: L	Default = Omissoin. Only color printer "C" initial .Engine = E	Division between code						
Description	Alphabet			-	Digit				Alphabet	

7.8.3 Understanding Material Code & Name

Material code and name is maintained by standard criteria.
If understand the criteria, it will help to order materials.

1. Two different description ways for material code. (● : Digit, ■ : Letter(Alphabet))
   - Type 1 ●●●-●●●●●● ex) 2007-007961 R-CHIP
   - Type 2 ■■●●-●●●●●■ ex)JB96-01268A ELA UNIT-COVER TOP

   Type 1 : Parts managed by entire divisions : Materials used by all samsung products.
   Most electrical parts are under the type 1.
   Type 2 : Parts managed by a division : Material used by a certain product
   Most mechanical parts are under type 2.

2. A/S Only material : Only for A/S, not related to product manufacturing.

3. Ass'y material : More than two materials are assembled. If the material order is out of service, the order can be processed by Ass'y material order.
   Picture and numbers are also described on Service manual.

※ Ass'y Material and A/S Only material Code are recognizable by product name.
Those are under type 2 and known by material properties and beginning letters of product name.

Classification	Material Code	Material Name
A/S Only Material	**81-******(JB81-00039A)	AS-*****(AS-FUSE)
A/S Only Material	**75-******(JB75-00068A)	MEC-*****(MEC-CHUTE)
A/S Only Material	**92-******(JB92-01131A)	PBA-*****(PBA MAIN-CONTROLLER)
A/S Only Material	**96-******(JB96-01268A)	ELA-*****(ELA UNIT-COVER TOP)
A/S Only Material	**97-******(JB97-01089A)	MEA-*****(MEA UNIT-PULLEY IDLE)

7.8.4 F/W Upgrade Method

※ If F/W needs Upgrade, F/W file and usbprn file are requested.

■ Check "Ready" condition with power ON.

1. Paralle cable case
   • Start Download Rom file with "copy/b b255_706.fls lpt1:" commend on Dos Mode.
   • Once Download are finished, "Reset Printer" is indicated on LCD window.
   • Download finished ▶ Power ON/OFF.

2. USB cable case (Save attached file at certain directory)
   • Start Download Rom file "usbprbs b255_706.fls" on Dos Mode and push the enter key.
   • Once Download are finished, "Reset Printer" is indicated on LCD window.
   • Download finished ▶ Power ON/OFF.